Aggregate and Cross-Sectional Analyses on Capital Structure of Japanese Manufacturing Corporations

Thesis submitted

in partial fulfilment of the requirements

for the degree of

Master of Philosophy in Economics

by

Kok-Fai Chung

Department of Economics

The Chinese University of Hong Kong

Shatin, Hong Kong

July 1995

Abstract

We study the capital structure decisions of the Japanese manufacturing corporations from both the aggregate and cross-sectional perspectives. On the aggregate side, we find that the Japanese manufacturing corporations have depended heavily on debt and bank loans for financing for a long time. Nevertheless, with the advent of financial deregulations since the late 1970s in Japan and the increase in the availability of internal funds, the Japanese manufacturing corporations have shifted their reliance on bank loans to bond issue and internal funding, reflecting in the persistent decline in their aggregate debt ratio. On the cross-sectional side, we study econometrically the determinants for the heterogeneity in debt-equity choice among the Japanese manufacturing corporations. We find that conventional theories of capital structure such as the static tradeoff theory are very helpful to us to understand the actual debt-equity choice in Japan. At the same time, we also study the heterogeneity in bank loan-bond issue choice among these corporations based on the hidden information framework propounded by Mackie-Mason (1990). We find that while the hidden information story can explain this choice, there is still a large residual yet to be accounted for. It suggests the need for further theoretical work in this area.

Table of Content

Chapter 1: Introduction

In a path-breaking paper, Modigliani and Miller (M-M) (1958) has derived a proposition which states that under the condition of frictionless capital market, capital structure decision is irrelevant to the value or the cost of capital of the firm. This finding is very striking to the financial economists and the financial practitioners in the business world since it seems hard to be squared with their beliefs and some empirical observations suggesting that capital structure should matter.

One of such observations comes from Japan. If capital structure is really irrelevant, then any mix between debt and equity would be equally fine to the firms anywhere so that there should not exist any marked and systematic differences in the capital structure of different countries. Nevertheless, the figures in Table 1.1, which compares the aggregate equity ratio of the Japanese corporations and that of the major industrialized countries, tell us that this expectation is not in accord with empirical observation,

Table 1.1: Comparison of Aggregate Equity Ratio between Japan and Selected Western Countries, 1978 - 1990[a]

	1978	1982	1986	1990	Average
Japan	0.1990	0.2340	0.2792	0.3140	0.2517
Germany	0.3517	0.3458	0.3800	0.3861	0.3652
UK	0.4612	0.4582	0.4895	0.4842	0.4747
Canada	0.5271	0.5066	0.5287	0.5163	0.5241
US	0.6587	0.6809	0.5963	0.5310	0.6250

a Equity ratio is defined as the ratio of equity to total asset. Source: OECD Financial Statistics Part 3: Non-financial Enterprises' Financial Statements, various issues.

It is interesting to find that the differences in equity ratio between the Japanese corporations and their western counterparts are marked, ranging from 0.11 (Japan versus Germany) to 0.40 (Japan versus the US) on average. Meanwhile, the ratio for Japan is consistently the lowest among the major industrialized countries. Equivalently, it means

that the Japanese corporations on average seem to have a greater preference for using debt than their western counterparts.

These observations not only suggest that the original M-M proposition cannot be directly applied to the real world phenomenon, but also highlight Japan as an unique case in capital structure and thus it represents an interesting issue to be investigated. Despite this, there have only been a few studies which address the issue of capital structure of the Japanese corporations. With respect to the aggregate capital structure, the relatively well-known studies are the two papers by Hodder and Tschoegl (1985 & 1991), the latter of which in fact can be regarded as an updated version of the former. Being surveys on the salient characteristics of every fund source such as bank borrowing, equity and bond issues, their studies are highly successful in providing the readers with a broad overview of the corporate finance in Japan. Nevertheless, the shortcoming of such a broadbrush approach is that they fail to document systematically the observed aggregate pattern of capital structure of the Japanese corporations as well as to provide explanations for it, the issues that we are interested.

Meanwhile, there is only one study which focuses on the subject from the cross-sectional perspective. Nagatani (1985) has conducted an econometric study on the capital structure choice of the Japanese manufacturing corporations. In fact his objective is to examine the possible differences in various economic behaviours between the firms affiliated with industrial groupings (*keiretsu*) and the non-affiliated firms and debt-equity choice is one of the areas under study. However, his study has suffered from at least two drawbacks. First, as pointed out by Hadley (1985) and will be explained in more detail in the coming chapter, there are doubts in the classification of firms into affiliated and non-affiliated firms. It is critical because the estimation results are sensitive to the categorization of firms. Second, in the regression equation, there are only three explanatory variables: total asset, seven dummies for *keiretsu* affiliations, and 16 industry dummies. In other words, Nagatani has omitted a number of relevant variables suggested by the capital

structure literature in the estimated equation (e.g. non-debt tax shield), resulting in possible possible bias in the parameter estimates.

In short, the existing studies on capital structure of the Japanese corporations are far from complete and systematic. In view of this, we shall try to contribute to the literature by providing a comprehensive and systematic treatment of the subject. Specifically, we shall carefully document both the aggregate and cross-sectional patterns of capital structure of the Japanese corporations and attempt to provide explanations for the observed patterns. In order to narrow the scope, we shall only concentrate on the Japanese manufacturing corporations in the present study.

The organization of this study is as follows: In Chapter 2, we shall review the major theoretical and empirical findings in the capital structure literature, which will serve as an important basis for studying the observed capital structure pattern in Japan. In Chapter 3, we shall take up the issue of aggregate capital structure of the Japanese manufacturing corporations. Conceptually it can be divided into two parts: In the first part, we try to delineate the major features of the aggregate capital structure of the Japanese manufacturing corporations. In the second part, we shall provide institutional and theoretical explanations for our observation. Then in Chapter 4, we approach the issue from the cross-sectional perspective by analyzing econometrically the interfirm differences in capital structure of the Japanese manufacturing corporations. Similar to the Chapter 3, we shall first document the pattern of interfirm differences in capital structure and then estimate an econometric model to identify the relevant determinants of such differences. Apart from the usual debt-equity choice, in this chapter we also study the bond-bank loans choice motivated by a similar study by Mackie-Mason (1990) on the US firms. We include this into our study because we think that this kind of capital structure choice is as important as the conventional debt-equity choice to the financial managers. However, there has been no framework in the literature to deal with this choice. The situation is changed after the publication of Mackie-Mason's work, which offers a simple framework

(which is known as hidden information framework) for analyzing this choice. We shall adapt his framework to the case of the Japanese manufacturing corporations. Finally Chapter 5 concludes the present study and suggests a number of future research direction.

Chapter 2: Corporate Capital Structure Decision: A Review of Theory and Evidence

"All theory depends on assumptions which are not quite true. That is what makes it theory. The art of successful theorizing is to make the inevitable simplifying assumptions in such a way that the final results are not very sensitive. A "crucial" assumption is one on which the conclusions do depend sensitively, and it is important that crucial assumptions be reasonably realistic. When the result seems to flow specifically from a special crucial assumption, then if the assumption is dubious, the results are suspect." (Solow (1956), pp.65).

A. Introduction

These statements from Robert Solow clearly convey the message that we need to identify the crucial assumption(s) of each theory and make sure that it is (they are) consistent with the reality so that the implications of the theory will be of value in explaining empirical observations. In fact he had done the job in the modelling of economic growth so well that he was awarded the Nobel Prize in 1987 for this work.

Judging from the development of the literature of corporate capital structure decisions since the publication of the path-breaking paper of Modigliani and Miller (M-M) in 1958, financial economists also seem to be very concerned with the task of identifying and modifying the crucial assumptions underlying the original M-M theorem. The ultimate motivation is surely to demolish the conclusion of the first proposition of M-M theorem that capital structure is irrelevant to the value of the firm, which is too hard to be accepted as a good approximation of reality. After the endeavours for some 35 years, the literature has accumulated a wealth of findings, both theoretical and empirical, with which we are now in a good position to understand the factors governing the corporate capital structure choices.

In this chapter, we are going to review the key findings of this vast literature. The discussions will be divided into four parts. The first three parts correspond to each of the three major theories of capital structure, namely the static tradeoff theory, the agency

theory, and the asymmetric information theory, which are motivated respectively by the tradeoff between tax and bankruptcy cost considerations, conflicts of interests among managers, shareholders and creditors, as well as the differential access to a firm's private information between the insiders and the outside investors. Within each part, we shall first delineate the major theoretical arguments in their stripped-down form and then present the relevant empirical evidence to see how useful the arguments are in explaining observed capital structure choice.

As we shall see, one of the common features shared by most of these models (except the model of Myers and Majluf (1984)) is their postulate that there are essentially two kinds of financial instruments available to firms: debt and equity, and thus they fail to provide explanations regarding the choice among different types of debts (e.g. bank loans versus bond issue) or equity (e.g. internal funds versus equity issues). In fact there is no framework for dealing with such choices until the publication of the work by Mackie-Mason (1990). We shall review his work in Section E. Section F will conclude the present chapter.

B. Static Tradeoff Theory

As hinted by its name, the static tradeoff theory views that the optimal debt policy is determined by the tradeoff between the tax benefits and the cost of wasted non-debt tax shields as well as the expected bankruptcy costs associated with using debt. In fact the theory is the result of relaxations of two major assumptions in the original M-M model, namely no tax and no risk of bankruptcy of debt.

The first step in the modification of original M-M model was taken by M-M themselves (1963). In that study, they assume that, unlike in the original model, corporations now need to pay corporate income tax. Coupled with the fact that interest payments by a firm is tax deductible whereas the distributed income is not, it follows that there is a tax

advantage in using debt over equity in financing corporate expenditures and the optimal capital structure should be 100% debt.

Of course the 100% debt conclusion is as controversial as the original irrelevance conclusion as we hardly observe any firm which finances all of their assets with debts. One of the major points that the above argument overlooks is that by affecting the relative effective yields of interest income and dividend income, and hence the supplies of debts and equity capital, personal tax rates also matter (Miller (1977)). If personal tax on interest income (which is often the same as the ordinary personal income tax rate) is well above that on income stream from equity, then it could outweigh the tax shield advantage of interest payments such that totally unlevered will be the best policy. Specifically, the net tax advantage of debt is captured by the present value of the interest tax shields (PVi), which is defined as follows (assume the debt is perpetual at fixed interest rate),

$$PVi = (1 - \gamma)B$$

where $\gamma = [(1 - t_c)(1 - t_{ps})] / (1 - t_{pd})\}$, t_c is the corporate income tax, t_{ps} and t_{pd} are the personal tax rates on equity income and interest income respectively, and B is the amount of debt. $(1 - \gamma)$ can be termed as the debt incentive tax ratio which measures the net tax advantage of each dollar of corporate debt. Clearly, the debt incentive tax ratio is critical to the determination of optimal capital structure by affecting the present value of interest tax shield. If $(1 - \gamma) > 0$, then PVi is positive and thus 100% debt will be optimal. On the contrary, if $(1 - \gamma) < 0$, then the optimal policy is 100% equity. Capital structure will be indeterminate if $(1 - \gamma) = 0$.

To test this implication, it is simply to calculate the debt incentive tax ratio and to compare the implied value of capital structure with the actual one. Data provided by Taggart (1985) is useful to us. He has computed the debt incentive tax ratio in US from the late 1910's to 1980 and found the ratio not only positive but also increasing over time.

By the above argument, the aggregate debt ratio of the US corporations should be 1 throughout the period. Nevertheless, the actual ratio was ranged only approximately from 0.1 to 0.4, even though there seemed to be a positive association between these two series during the postwar period[1]. Therefore, there must be some counteracting forces such that the unlimited appetite for debt finance under taxation effect can be checked, and it is precisely how the non-debt tax shields and bankruptcy cost enter the picture.

As allowed by the tax laws in many countries, firms are able to deduct certain types of expenses from the gross profit in the calculations of taxable income on top of interest payments like the expenses on depreciation as well as research and development. At the same time, there may also be various kinds of tax credit granted to firms, such as investment tax credit. All the tax savings generated from these expenses and tax credits are collectively called non-debt tax shields. The greater the amount of these non-debt tax shields, the closer of a firm to the state of tax exhaustion (which refers to the situation in which the amount of these expenses is so great that the firm need not pay any tax), and thus the tax advantage of debt will reduce or even vanish (DeAngelo and Masulis (1980); Dotan and Ravid (1985)). This negative relationship between the amount of non-debt tax shield and debt usage has been tested by a number of cross-sectional studies. Nevertheless, the results are mixed which may be due to the problem of accurately measuring the amount of non-debt tax shields. Bradley, Jarrel and Kim (1984) have found the relationship positive and significant. Meanwhile, Long and Malitz (1985) and Titman and Wessels (1988) have obtained the expected negative relationship but it is not significant.

Apart from non-debt tax shields, the expected cost of bankruptcy also serves to deter a firm from using debt excessively. The more debt a firm uses, the greater interest payments will be incurred. As a result, the probability that the operating income is not sufficient to cover interest payments, and hence being bankrupt and liquidated, will be

increased. The cost of bankruptcy consists of two components: direct cost and indirect cost. Direct cost refers to the out-of-the-pocket expenses associated with the legal and administrative process of bankruptcy whereas indirect cost is the implicit cost related to bankruptcy which can be manifested in several forms. One form is the reduced investments and sales. When a firm has financial distress, it may find it difficult to convince its creditors to supply more capital even though it has a profitable investment project. Meanwhile, customers may no longer buy from a financially-troubled firm for fear that the warranty on the product may not be honoured in case the firm is bankrupt. Another form of indirect cost of bankruptcy comes from the premium required by creditors on their lending due to their perceptions of opportunistic behaviour of managers when the firm is at the brink of bankruptcy. Myers (1977) presents an analysis in which when a firm has difficulties in making promised payments to creditors, it may have incentives to reduce the firm value such as the failure to exploit profitable investment opportunities. The greater the debt a firm uses, the greater the incentives for the managers to behave opportunistically during financial distress, and the higher the premium will be required by the creditors on their lending to the firm.

Several studies have attempted to estimate the magnitude of these bankruptcy costs. Warner (1977) has estimated on average the direct cost of bankruptcy for a number of railroad firms in US which were in bankruptcy proceedings during 1933-55 accounted for about one percent of their market value prior to bankruptcy. Meanwhile, Weiss (1990) has found that such costs were about three percent of market value for a sample of firms that had filed for bankruptcy protection in US during 1980 and 1986. As to the indirect cost of bankruptcy, Cutler and Summers (1988) have tried to detect these costs in their study on the events following Pennzoil successful $10 billion judgement against Texaco and Texaco's subsequent attempts to overturn this judgement. It is expected that the outcome of the litigation favouring one firm over the other would not affect their combined value since they were fighting for a lump-sum transfer. Cutler and Summers, however, have found that when the court ruled against Texaco, the combined value of

both firms fell more than $3 millions, which was much larger than the administrative costs incurred during the dispute. They interpret this loss as an indirect cost of financial distress. With $10 billion liability to Pennzoil, Texaco found itself less able to raise capital and operate efficiently.

For firms to care about bankruptcy costs in determining debt policy, the magnitude of these costs must be great. However, it is difficult to tell what is meant by "great", and thus direct estimations of the magnitude of bankruptcy costs as done by the above studies may not be very useful to the examination of debt usage behaviour. In light of this, there are other empirical studies which test the implications of the bankruptcy cost argument on corporate debt policy. Specifically, they have tested the effects of the following variables,

1. Firm size: The larger the firms, the more diversified portfolio it can have, and thus the lower the bankruptcy risk. Therefore, larger firms are expected to be able to support more debt (Smith and Warner (1979)). The results are in general consistent with this implication (Friend and Hasbrouck (1988); Crutchley and Hansen (1989)).

2. Business risk: Since business risk and the risk associated with debt usage decision (i.e. financial risk) jointly define the total risk of bankruptcy of a firm, we expect that the firms with greater business risk will use less debt to control total risk. The direction of the estimated effect is, however, not wholly agreeable to our *a priori* expectation. By using profitability variability as proxy, Gordon (1962) obtains a negative relationship even though Ferri and Jones (1979) finds no effect. Auerbach (1985) uses two risk variables: variance of firm value, which enters in a negative direction, and variance of earnings, which enters positively, even though both of them are statistically insignificant.

3. Amount of tangible assets: The eventual amount received by creditors when a firm is bankrupt and liquidated depends, among other things, on the attributes of the firm's asset. One of the important attributes is the tangibility. Tangible assets are of more value than the non-tangible assets (such as goodwill) under bankruptcy since the value of the latter will dissipate when the firm ceases to be a going concern whereas the former will be less so. Therefore, the creditors of a firm with more intangible assets will require a higher premium for their lending, which thus discourages the firm's use of debt (Myers (1983); Long and Malitz (1985)). In general, this proposition is supported by data (Marsh (1982); Bradley, Jarrel and Kim (1984); Long and Malitz (1985).

C. Agency Theory

The application of agency theory to the field of finance can be traced to the classic work of Jensen and Meckling (1976) which builds on the earlier work by Fama and Miller (1972). Jensen and Meckling attempt to examine the impacts of conflicts of interests between various parties of a firm, namely the shareholders, creditors, and managers, on corporate capital structure decision, a possibility which is not considered by the original M-M model. Their central argument is that the optimal capital structure can be regarded as the outcome of a tradeoff between the agency cost of equity versus that of debt, which in turn arises respectively from the conflicts of interests between the managers and shareholders as well as between shareholders and creditors of the firm. In what follows, we shall discuss briefly these conflicts in turn and show how they give rise to the optimal capital structure.

The conflict of interests between managers and shareholders arise because the former hold less than 100% of residual claims of the firm. Consequently, while they bear the full cost of their profit enhancement activities, they can only capture a part of the gains. The cost borne by the managers in enhancing the profits of a firm can be manifested in many ways, including their efforts put on the job and the forgone perquisites such as corporate jets or

plush office. The direct implication is that the managers will only work at the level which maximize their *net* benefits, which is not necessarily congruent with the value-maximizing effort as desired by the shareholders. The forgone profits due to "shirking" of managers as well as their consumption of firm resources for private use are examples of the agency cost of equity. The use of debt can help lower such costs in several ways. First, holding the investment of the managers in their firm constant, the more debt is used, the larger the equity stakes held by the manager will be which increases their incentives to enhance the profits of the firms. Second, as pointed out by Jensen (1986), since debt commits cash payments to creditors, it reduces the amount of *free cash flow* (i.e. the amount of cash flow in excess to fund all projects that have positive net present value (Jensen (1986); pp.323) available to managers to be engaged in the consumption of perquisites. All these implications point to the conclusion that the more debt a firm uses, the less agency cost of equity will be[2].

Nevertheless, it does not imply that the optimal capital structure should be 100% debt since debt *per se* also gives rise to another kind of agency cost due to the possible conflicts of interests between shareholders and creditors. Such conflicts occur because the shareholders have incentives to invest suboptimally (from the perspective of firm value) when debt is used. Specifically, shareholders are interested in undertaking risky projects even though its expected net present value is negative. It is the case because when the project succeeds, then the shareholders will gain a lot but if it fails, most of the loss will be borne by the creditors under the provision of limited liability. Another possibility is that, given the firm borrows at the first place, its shareholders may fail to undertake investment projects with positive net present value as most or even all of the cash flow will be used to service the senior debts. As creditors are assumed to be aware of these incentives of shareholders, they will require premiums on their lending to the firm. Since the more debt a firm has, the greater incentives of their shareholders to invest suboptimally, creditors will accordingly demand more premiums on their lending. In other words, the agency cost associated with the conflicts of interests between the

shareholders and creditors will increase with the amount of debt relative to equity. Together with the argument of agency cost of equity mentioned above, the optimal capital structure can be determined by the tradeoff between the agency cost of equity (which is decreasing in debt-equity ratio) and that of the debt (which is increasing in debt-equity ratio).

A number of implications flow from this agency cost framework. First, holding other things constant, the larger the equity stakes held by the managers, the less debt will need to be used to induce the managers to behave in the firm-value-maximizing manner. Friend and Hasbrouck (1988) have tested this proposition and found that the relationship is negative but significant only in some specifications[3]. Second, the greater the amount of free cash flow, the more resources available to managers for their own perquisites consumption, and thus the more debt will be used. Nevertheless, this implication has been rejected by Chaplinsky and Niehaus (1990). Third, given the possible conflicts of interests between the shareholders and creditors, the latter may have incentives to use covenants to restrict the behaviour of shareholders. Such covenants do exist in reality. Smith and Warner (1979) have examined actual covenants used by the bondholders in the US. They have found that since monitoring is costly but necessary to make sure the shareholders to comply with the covenants, the bondholders will tend to adopt the covenants that restrict the dividend and financing policies instead of restricting the type of production and investment project to be undertaken. It is the case because, while both serve to prevent the shareholders from transferring the wealth from bondholders to shareholders, the former option entails less monitoring cost since the dividend and financing behaviour are readily observable by the bondholders whereas it is difficult and very costly to evaluate the optimality of a project by the bondholders.

D. Asymmetric Information Theory

Apart from the considerations of taxation, bankruptcy cost and agency cost, the problem of asymmetric information can also affect the choice of corporate capital structure. The models that are based on this information problem can be regarded as attempts to relax the assumption of perfect information implicit in the perfect capital market assumption in the original M-M model. Two main strands of thoughts can be demarcated. The first strand can be represented by the work of Ross (1977), which posits that capital structure serves as a signal revealing the private information wielded by insiders to outside investors. The second strand was initiated by Myers and Majluf (1984), which views that capital structure is the result of mitigating the inefficiencies in the firm's investment decisions that are caused by the information asymmetry problem. We shall discuss them in turn.

Signalling Approach to Capital Structure

Built on the signalling model of Spence (1974) and Riley (1979), Ross (1977) formulates a model in which the management's choice of the firm's debt-equity ratio acts as a signal conveying information to outsiders about the firm's future returns, which are supposed to be known by the managers only. Managerial rewards depend on the firm's current and future valuation of the firm, with a penalty being levied if the firm goes bankrupt in the future. If various restrictions on the parameters of the managerial reward function is satisfied, then a signaling equilibrium will exist in which firms with higher expected returns will use more debt, so that outside investors can infer the management's inside information about the future returns of the firm by observing the debt equity ratio.

One implication is directly generated from this account of capital structure: debt ratio is positively related to future profitability of a firm. Nevertheless, there has been no empirical study so far to take up this task, which may be due to the complications involved in the estimation of future profitability. Some studies have been conducted to

test the relationship between leverage and current profitability of the firms, all of which show that the relationship is negative (Friend and Hasbrouck (1988); Titman and Wessels (1988)). Despite this, it is not necessary to be a counter evidence to Ross' model since current and future profitability is not necessarily related. As we shall see, this negative relationship between current profitability and leverage is consistent with one of the implications of the model of Myers and Majluf (1984), to which we now turn.

Interaction between Investment and Capital Structure

Myers and Majluf (1984) are concerned with how the problem of information asymmetry may lead to underinvestment of a firm. Their argument is as follows, which is basically applying Akerlof's model to financial and investment problems. Suppose there are only two kinds of firms which differ in their asset value only. Investors know this but cannot identify which firms have higher asset value. Therefore, their valuations of all firms' equity will be identical, which is equal to their average valuation of their claims on income from high value firms and that on low value firms. Since the asset value of a firm depends on the amount of income it generates, it implies that the equity of the high value firms will be underpriced whereas the converse is true for low value firms. Therefore, if both types of firms face the same project with positive net present value and if they can only issue equity to finance it, then the low value firm will always undertake the project and issue new equity since it is overpriced by the investors. As to the high value firms, they will take up the project if and only if the loss of firm value due to underpricing by investors is smaller than the net present value of the project. When this inequality is reversed, then the high value firms will not take up the project, which is the problem of underinvestment mentioned above.

Clearly, asymmetric information between the insiders and outsiders is the key to underinvestment of the high value firms noted above. However, if these firms have internal fund or access to riskless debt, then the information asymmetry problem will vanish and the firm will finance the project with these sources of funds. This has given

rise to the well-documented pecking order theory. It states that in financing investments, firms prefer first internal fund or riskless debt to risky debt or new equity issues[4]. One of the major implications is that if the availability of internal funds increase, then firms will use more such funds and reduce their reliance on external finance. Since internal fund is one kind of equity capital, this is translated into that the availability of internal funds is negatively correlated with leverage. The empirical studies that test the relationship between the profitability and debt ratio noted above have confirmed this implication. Another major implication of Myers and Majluf's model is that as new equity issue signals the issuing firm is very likely a low quality firm, then the announcement of share issue by a firm will lower its overvalued share price. This "announcement effect" has also been well-documented by a number of empirical studies, including Asquith and Mullins (1986), Masulis and Korwar (1986), and Mikkelson and Partch (1986).

E. The Choice of Providers of Finance

As we have seen, apart from the model of Myers and Majluf (1984), all other models presume that firms have only two kinds of financial instruments to be used to financing: debt and equity. This presumption, however, has prohibited the financial economists in analyzing another type of financing decision which is equally important to the decision of debt-equity ratio to the real world financial managers: the choice of providers of financing, given the type of instrument. Mackie-Mason (1990) has attempted to set out a framework to analyze this choice, which in fact is another version of lemons model of Akerlof (1970) and Myers and Majluf (1984). We are going to briefly discuss his framework and empirical results.

Investors' valuations of a claim on a firm's future cash flow depends on their information, and hence perception, about the future performance of the firm. Differential access to this information of a firm would lead to variations in its valuation among investors. The more the information an investor has, the closer of his valuation of a claim to the future cash flow of firm to its "true value", and the less lemon premium is required. It is the

ultimate assumption on which the empirical study of Mackie-Mason is based. It follows that if the investors have more information about the future earnings of Firm A than Firm B, then they will require a higher lemon premium on the latter than the former. Consequently, Firm B may find that it is not worthwhile to seek finance from the public securities market and tend to turn to the private sources: internal funds or bank loans. By contrast, since the lemon premium faced by Firm A is lower, it will tend to raise funds from the public market. In other words, it is the differential access to firms' private information, and hence the relative amount of lemon premiums required by investors, which determines the different pattern of private versus public financing decision made by different firms.

Since *a priori* it is difficult to tell the investors' information about different firms, Mackie-Mason has used a number of so-called "hidden information indicators" to distinguish the firms that have more private information unrevealed to the public investors from those that have less in order to test the above proposition. They include the following,

1. Dividend payment: If dividend payment serves as a signal about the private information about the firm, as modelled by Bhattacharya (1979), John and Williams (1985), and Miller and Rock (1985), then investors should possess more information about the dividend-paying firms than that of the non-dividend-paying firms. By the above argument, dividend-paying firms will tend to use more market sources of finance relative to the non-dividend-paying firms.

2. Forecast variance of earnings: If investors are well-informed about the future prospects of a firm, then the error of their forecasted earnings will tend to be small. Therefore, if it turns out that the forecasting error is large, then we expect that investors are relatively poor-informed about the firm. Mackie-Mason has used the standard deviation of the first difference in earnings as the proxy of this forecasting variance based on the well-established result that the former is proportional to the

latter due to the random walk behaviour of earnings (Watts and Zimberman (1986), chapter 6).

3. Change in stock price: An increase in a firm's stock price may indicate that the investors have become convinced of a favourable improvement in the firm's prospects, and thus are more likely to believe that firms seek finance for good projects rather than bad. The greater the increase, the clearer the signal it is, and thus the less lemon premium will be required.

4. Industries under government rate regulation: If an industry is under the rate regulation of government (such as airlines and telephones in US), then the investors of the firms belonging to this industry will be better-informed since the regulators are supposed to take up the role of information collector and validator for public investors and make any bad news about these firms public. Therefore, we expect these firms will use more public or market sources of finance.

5. Tax-loss carryforwards: Under the US tax laws, firms are allowed to carry their loss backwards or forwards to decrease their tax payments. If carrybackwards is used, then the firm will get the immediate refunds. By contrast, if the loss is carryforwards, then it is credited against the future income without the accumulation of interest. That is why if both options are available to firms, then they will always choose carrybackwards. If a firm is observed to carry their loss forwards, then it signifies that it has been a poor performer in the past few years. Once it is identified as a poor performer, then the lemon premium required by investors will be larger compared to other firms.

6. R&D intensity: When a firm is doing a lot of R&D activities, then we can expect that its manager will possess more hidden information about the future prospects of the

firm than the public investors. As a result, such firm will tend to use less market sources of finance but more private sources.

Based on the incremental financing data of a sample of US firms, Mackie-Mason has found that all hidden information indicators but the R&D intensity have the expected signs and most of which are statistically significant. These evidences serve to emphasize that firms are concerned with both the debt-equity and private-public choices[5].

F. Concluding Remarks

In this chapter, we have gone through a whirlwind tour on the major arguments of capital structure literature. Judging from the empirical evidences, it is fair to say that all the major theories of debt equity choice, namely static tradeoff theory, agency theory, and asymmetric information theory, have bearing on the actual corporate capital structure choices. Therefore, in conducting empirical studies on capital structure, it seems necessary to take all the considerations of these theories into account so as to achieve a more complete explanation. At the same time, the study by Mackie-Mason has furnished us with a conceptual framework for understanding the choices between bank loans and bond issue as well as between equity issue and internal fund respectively.

With the basic understanding about the various arguments of capital structure decision, we now turn to the analysis of aggregate capital structure choice of the Japanese manufacturing corporations. As we shall see, the pecking order hypothesis plays a crucial role in explaining the recent declining trend of aggregate debt ratio in Japan.

Notes:

[1] One caveat is in order. Taggart (1985) proxies the debt incentive tax ratio by $(t_c - t_p) / (1 - t_p)$, which differs from $(1 - \gamma)$ in that the former assumes personal tax rate on equity income is zero and substitutes t_p for t_{pd}, where t_p is the *lowest* personal income tax rate. Without regard to the other higher personal income tax rates and personal income tax rate on equity income, the ratio used by Taggart (1985) can only imperfectly gauge the net tax advantage of corporate debt. In spite of this, even if we take these factors into account, it seems unlikely the debt incentive tax ratio to be zero throughout the period under study as required by the tax incentive argument to explain the actual aggregate debt ratio in US.

[2] As suggested by Grossman and Hart (1982), there is another kind of benefit associated with using debt. If bankruptcy is costly to managers (perhaps due to the loss of benefits of control or reputation), then they will put more efforts on profits enhancements as the proportion of debt increases to counteract the increased likelihood of bankruptcy.

[3] Note however that the underlying hypothesis on which the testing of Friend and Hasbrouck (1988) is based is not the same as the story depicted in Jensen and Meckling (1976), even though both of them yield the same testable implication. Friend and Hasbrouck argue that compared with the shareholders of a firm, the managers in general are more risk-averse since their stakes in the firm (namely the equity stakes and human capital) are critically contingent upon the firm as a going concern. The portfolio of an average shareholder, by contrast, tends to be more diversified. As a result, the managers will tend to use a relatively low debt policy as justified by the postulate of firm value maximization. It follows that the larger the equity stakes the managers hold, the greater loss they will incur if the firm is bankrupt, and the greater incentives for them to decrease the debt usage of the firm.

One of the crucial differences between the hypothesis of Jensen and Meckling and that of Friend and Hasbrouck is in the assumption about whose interests are being taken care when designing a firm's capital structure. In Jensen and Meckling model, it is the interest of shareholders matters whereas in the hypothesis of Friend and Hasbrouck, what matters is the managerial interests. In reality, it is common for the managers of a firm to decide its capital structure. However, when the interests of managers and shareholders are divergent, it seems that it is not likely for the managers to choose a capital structure which is not favoured by the shareholders as doing so may mean loss of jobs. Therefore, we consider that the hypothesis of Friend and Hasbrouck is less appealing relative to that of Jensen and Meckling.

[4] It is different from the modified pecking order, which states the preference ordering of firms over alternative sources of funds is as follows: internal fund or riskless debt, risky debt, and new equity issue as last resort. In fact the model of Myers and Majluf only

implies that only the debt that are not sensitive to the private information is preferred to equity (i.e. riskless debt). To transform the original pecking order to the modified, additional assumptions are required such as the lognormal distribution of changes in firm value (Myers (1984)).

[5] It should be noted that the treatment by Mackie-Mason on defining actual financing choice the firms in the sample is problematic. He assumes that firms will only make one choice of fund source once a year to facilitate the nested-logit estimation of the model. However, in general firms will change their uses of more than one fund source within a year. To get around this problem, he proceeds as follows: He codes the choice variable as "new shares" if the firm issues stock, regardless of other sources of funds; "bonds" if issues bonds; "private debt" if the net increase in debt sources exceeds that of equity (but the firm does not issue bonds); "retained earnings" in all other cases (pp.86). Note the problem is only got around by arbitrarily defining the choice variable, which is not an acceptable procedure. In view of this, we shall not adopt his approach in our study. Our approach will be delineated in Chapter 4.

Chapter 3: An Analysis on Aggregate Capital Structure of Japanese Manufacturing Corporations

A. Introduction

In this chapter, we shall document the subject of corporate finance from the aggregative point of view. Specifically, we shall delineate the recent trend of aggregate debt usage behaviour of Japanese manufacturing corporations and try to figure out the driving forces contributing to this trend. The discussions in this chapter not only offers a perspective on the aggregate pattern of corporate finance in Japan, but also contains many regulatory and institutional details which will be highly useful to our study on interfirm financial heterogeneity in the next chapter.

The organization of this chapter is as follows. The next section will set the stage for the discussions of the whole chapter by documenting the recent trend of aggregate debt usage behaviour of the Japanese manufacturing corporations. As we shall see, the Japanese manufacturing corporations depended heavily on debt, particularly the loans from financial institutions[1], for financing. Nevertheless, this pattern of heavy debt usage had shown a drastic decline since the mid-1970's, which was primarily a reflection of the continued substitution of bond issues and internal funds for bank borrowings by the Japanese manufacturing corporations.

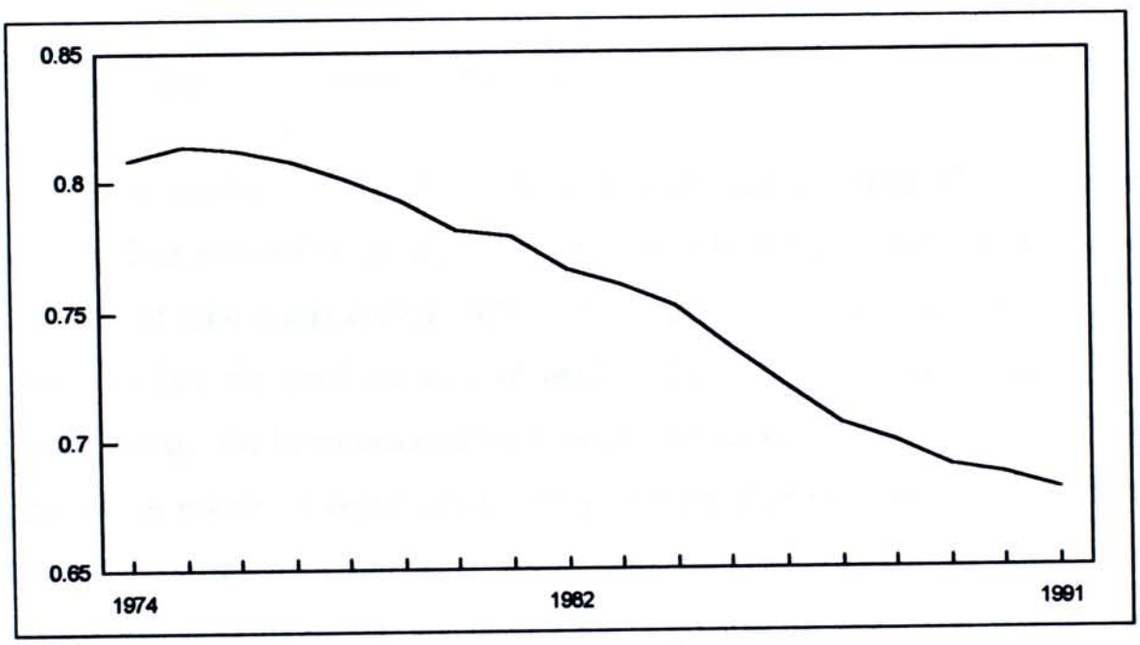
In Section C, we shall explore the reasons for the historical predominance of bank loans over the alternative sources of external funds and how it developed into main bank system in Japan. Then in Section D, we shall demonstrate the factors leading to the shift of reliance from bank borrowings to bond issues and internal funds. As we shall see, various financial deregulations beginning at the late 1970's and the increased availability of internal funds played pivotal roles in bringing about such substitutions. Section E will conclude this chapter.

B. Setting the Stage

The most direct method to gauge the aggregate debt usage behaviour is the aggregate debt ratio, which is defined as the ratio of total liabilities to total assets of all firms under study. Based on

the data of OECD Financial Statistics, we have computed the aggregate debt ratio of the Japanese manufacturing corporations during 1974 - 1991 and presented the data in Figure 3.1. Two observations can readily be noted. First, the usual characterization of heavy debt reliance is supported by the data. In fact, the average debt ratio during the period was 0.76, which was incredibly high from the perspective of western countries[2]. Second, while high on average, we can witness that the ratio manifested a drastic decline over time. In 1974, debt financed more than 80% of asset acquisitions of the Japanese manufacturing corporations. The corresponding figure for 1991, nevertheless, was lowered to 68% only.

Figure 3.1: Aggregate Debt Ratio of Japanese Manufacturing Corporations, 1974 -1991



Source: OECD Financial Statistics Part 3: Non-financial Enterprises' Financial Statements, various issues.

In order to look at the issue more deeply, we may discern the over time changes of various components of the aggregate balance sheet of the Japanese manufacturing corporations. Table 3.1 shows the major components of this balance sheet over the period 1974 - 1991,

Table 3.1: Major Components of Aggregate Balance Sheet of Japanese Manufacturing Corporations, 1974 - 1991[a]

	1974	1982	1991	1974 - 91
Liabilities				
- Bank loans	0.40	0.36	0.27	0.36
- Trade credit	0.22	0.22	0.18	0.21
- Other accounts payables	0.14	0.12	0.12	0.12
- Bond	0.01	0.02	0.07	0.03
Equity				
- Share capital	0.06	0.05	0.06	0.06
- Internal reserves	0.13	0.18	0.26	0.19

[a] All figures are expressed in percentage of total assets. Source: OECD Financial Statistics Part 3: Non-financial Enterprises Financial Statements, various issues.

The most notable feature about the aggregate balance sheet of the Japanese manufacturing corporations was their high degree of reliance on bank loans. On average, these loans accounted for 36% of total assets during 1974 - 1991, which were far greater than any source of external fund. In fact the predominance of bank loans in Japan could be dated back to the 1950's[3]. Nevertheless, the importance of bank loans was markedly decreasing over time by more than 13 percentage points. Concurrent to the persistent decline in the usage of bank loans were the increased dependence on bond issues and internal reserves as sources of funds. While comparatively unimportant, the proportion of bond in the aggregate balance sheet of the Japanese manufacturing corporations showed a great bounce, particularly after 1982. Meanwhile, the share of internal reserves also manifested significant increase. During 1974 - 1991, its ratio in total assets had doubled from 13% to 26%.

These observations collectively imply that underlying the continued decline in the aggregate debt ratio of the Japanese manufacturing corporations was primarily the enduring substitutions of internal funds and bond issues for bank borrowings by these corporations. Therefore, in order to understand the long term pattern of aggregate debt ratio, we need to know the reasons accounting for such substitutions. Before proceeding to accomplishing this task, we first explore

the reasons for the historical predominance of bank loans over the alternative sources of external fund in Japan and how it contributed to the emergence of main bank system in Japan.

C. Historical Predominance of Bank Loans in Japan and the Main Bank System

The predominance of bank loans in the domain of corporate finance in Japan by and large was a regulatory phenomenon. In 1947, the Foreign Exchange and Foreign Trade Control Law (FEFTCL) was enacted which forbade all kinds of cross-border financial transactions without the approval of the Ministry of Finance. Consequently, not only the foreign investors could not access to the Japanese capital markets, but at the same time most of the Japanese corporations were not able to raise funds from the overseas markets, and thus resorted to the domestic funds only. Nevertheless, there were a number of reasons in Japan (most of which were related to regulations) which discouraged the Japanese corporations from using the market sources of funds, leading to the observed heavy dependence on bank loans for financing. In what follows, we are going to spell out what these reasons are.

Let us begin with the impediments to bond issues. A key factor that discouraged the Japanese corporations from using bonds was the government control over the bond interest rate. In fact in issuing corporate bonds, their coupon rates were required to be linked to those of long term government bonds which were deliberately controlled at low level in order to lessen the interest obligations. If the interest rate for corporate bonds was not controlled, then it might end up with the situation that there would be no demand for government bonds. Therefore, in order to secure funds at low interest cost, the Japanese government controlled the interest rates of corporate bonds, which were the closest substitutes for government bonds[4]. As a result, corporate bonds were not attractive to the general investors (Hodder and Tschoegl (1985); Ballon and Tomita (1988)). It could be seen from the fact that over 1965 - 1970, bonds accounted for only about 5.7% of total financial asset of the personal sector[5].

While unattractive to investors, bond issue in the domestic market was also not appealing to the corporations due to the cost and cumbersome procedure for bond issuance. As to the issuing

cost, not only the issuing firms had to pay the management fees and underwriting commissions, but also the services charges imposed by the trustee. Meanwhile, the issuing corporations had to gain approval from a committee dominated by a group of large banks (*Kisaikai*) on the matters concerning the timing, volume, type, and the terms of issues. In other words, the banks were endowed with enormous powers to controlling the access to bond market by the Japanese corporations. Since bank loans and bonds were close substitutes, thus these banks had set the strict terms to discourage the Japanese corporations to issue bonds (Rosembluth (1989)). Moreover, since corporate bonds were discountable at the Bank of Japan, the authorities had great incentive to ensure the quality of the corporate bonds. In fact, the Bank of Japan and the Ministry of Finance monitored and occasionally exercised control over the selection of corporations qualified to issue bonds, the issuing terms, and even the total monthly amount of new issues (Goto (1980)).

Another factor which might also affect the effective cost of bond issue was the collateral requirement. Prior to 1979, all corporate bond issues were required to be backed up by collaterals[6]. The most common types of collateral were fixed assets such as factories and equipments of the firm (Suzuki (1990)). Thus the effect of collateral requirements fell more on the non-manufacturing firms than the manufacturing firms since the former tended to have less fixed assets to be pledged. Nevertheless, not all bank loans were secured. For example, in 1978, 32% of loans and discounts granted by the banks in Japan were unsecured[7].

The last regulatory constraint comes from Commercial Code (article 297), which explicitly stipulates that the outstanding bond amount of any corporation cannot exceed its equity capital. This regulation was an effective constraint on the Japanese corporations in issuing bonds since, as we have seen in Section B, they relied heavily on debt for financing. In other words, their base of equity capital was so thin that they were not able to issue much bonds.

Similar to the bond issues, the Japanese corporations did not rely much on stock issues as a source of fund. One major factor accounting for this was the traditional practice of share issue and dividend payment at par. Before 1969, all share issues were made at par (the par value of the

stock of most of the Japanese corporations was 50 yen per share). Moreover, there was an implicit rule (in fact an explicate rule to the corporations listed in the First Section of the Tokyo Stock Exchange) that the dividend payment should be 10% of the par value of the stock. Consequently, the dividend cost of share issues was expensive to the corporations, and thus discouraged them from heavily using them for financing (Hodder and Tschoegl (1993)).

These impediments, together with the fact that most of the financial assets of personal sector was placed as deposits in banks[8], made the Japanese virtually no alternatives but to turn to banks for investment funds to satisfy their enormous appetite for external funds to finance the postwar economic growth. Consequently, keeping close ties with major banks was important to the Japanese corporations, particularly during the period of credit tightness. This corporate need for stable source of credit supply had contributed to the rise of main bank system in Japan. Typically, as to a corporation, its main bank is its largest creditor as well as one of its largest shareholders (Sheard (1989))[9]. The most elaborate form of such main bank system is manifested in industrial groupings, or *keiretsu* in Japanese[10]. There are the six major *keiretsu* in Japan, including Mitsubishi Group, Mitsui Group, Sumitomo Group, Daiichi Kangyo Group, Fuyo Group, and Sanwa Group. The first three groupings have *zaibatsu* as their predecessors in the prewar era whereas the latter three were formed in the postwar era with the following city banks as their nucleus: Daiichi Kangyo Bank, Fuji Bank, and Sanwa Bank.

Apart from the lending and shareholding relationships, another major trait characterizing the relationship between a corporation and its main bank is the extensive information flow. This is achieved through two channels: director linkage and regular meetings of present councils. Main bank as a rule sends their staff to the affiliated firms to act as their directors. For example, in 1980 about half of the listed firms that had bank borrowings had at least one representative on their board from their main banks. Meanwhile, each of the major *keiretsu* has a regular forum at which the top-level executives of the core member firms meet. While these president councils have no decision power, they do provide another means through which the main banks can gather the key information about the core member firms.

In fact the arrangements of director linkage and the regular meetings of president councils would mean that the member firms of *keiretsu* will have to disclose their private information to their main banks. Why they are willing to do so? One justification is that it is the price to be paid in exchange for the continued supply of credit during tight credit condition. However, the model of Stiglitz and Weiss (1981) shows that firms may also be rationed out from the credit market irrespective to the aggregate credit supply condition. They argue that credit rationing may emerge as the profit-maximizing, and hence equilibrium situation under the condition of imperfect knowledge of lenders about quality of the borrowers. As a result, a portion of borrowing firms will be rationed out from the market even though they are willing to pay for the level of interest rate which is higher than the one set by the lenders. It follows that in order to get rid of the possibility of being rationed out, it may pay for the firms to develop close ties with the banks and disclose their private information to them[11].

Another salient feature about the main bank system, which is also a benefit to the *keiretsu* firms, is that when the member firms are in financial distress, their main banks will intervene and rescue them. The measures taken are varied case by case, ranging from reducing the amount of interest payment to reorganizing the firms by the replacing the existing management with the bank personnel or by arranging mergers with other firms[12].

One of the notable examples of such rescue operations is the case of Mazda during the mid 1970's. After the first oil crisis in 1973, the profitability of auto makers in Japan plummeted. It was especially the case for Mazda since its new rotary engine was not as fuel-efficient as traditional engines. The Sumitomo Bank, the main bank of Mazda, implemented a rescue operation: it provided new and cheap loans, sent several executives to improve management, and encouraged the firm to sell the shares in the bank. Other Sumitomo Group firms also joined the operation. Sumitomo Trust sent its employees as part of a new management team. Sumitomo Corporation, the general trading company of the group, helped to market the vehicles produced by Mazda. As a result of these efforts, Mazda recovered quickly and subsequently became a profitable firm[13].

Also interesting is the fact that, in cases of bankruptcy or major reorganization, the main bank typically absorbs the loan losses which are greater than its share (Sheard (1989). A case in point was Ataka & Co. which failed in 1975. Being the firm's main bank, Sumitomo Bank took up 59% of company losses, even though at that time it provided only about 15% of loan of the failed firm.

In view of these observed behaviour of main banks, it is natural to ask what is the rationale for such actions. Sheard (1989) has argued that it is consistent with the hypothesis of delegated monitoring pioneered by Diamond (1984). It makes sense for a single party to take up the monitoring task for the others in order avoid duplication of efforts. Within the context of main bank system, the firms' non-main-bank creditors simply delegate the task of monitoring to their main banks due to their ability to access the private information about the firms. When these firms fail, it may reflect the shirking on the part of their main banks. Then the rescue operations of main banks or their taking up larger share of loan losses are the costs incurred for their shirking[14].

D. Substitutions of Bond Issues and Internal Fund for Bank Borrowings

We have seen that the aggregate debt ratio of the Japanese manufacturing corporations had persistently been decreasing over time, which mainly reflected the continued shifting of reliance from bank borrowings to bond issues and internal funds. Also we have explained the factors accounting for the predominance of bank loans over alternative sources of external fund and the formation of main bank system. Now we are in the position to explore the causes of the substitutions of bond issue and internal funds for bank borrowings in financing corporate investments, which were in fact the results of financial deregulations and increased availability of internal funds respectively. We shall discuss them in turn.

Financial Deregulations and the Increased Dependence on Bond Issue

As mentioned before, financial regulation was a key factor explaining the disincentive of the Japanese corporations to use bonds. Therefore, it should not be astonishing to find that it was a series of deregulation in bond markets since the late 1970's which had led the Japanese

corporations to use more bonds. Table 3.5 shows the major regulatory changes that pertain to the corporate finance in Japan. The first major deregulatory move was the enactment of Temporary Measures on Limit of Bond Issue in 1977 which raised the limit of outstanding bond amount to twice the amount of equity capital. Then in 1978, medium term government bonds were offered through public auctions. Effectively, it signified the beginning of the deregulation of bond interest rate. Soon after this move, the interest rate on corporate bonds was also deregulated for fear of destroying the demand for corporate bonds after the liberalization of government bond market[15].

Table 3.5: Major Regulatory Changes Pertaining to Corporate Finance[a]

- Enactment of Temporary Measures on Limit of Bond Issue which doubled the allowable limit of outstanding bonds (1977).
- Sales of medium term Government bonds through public auctions (1978).
- Revised Foreign Exchange and Foreign Trade Control Law became effective which in principle liberalized all kinds of financial transactions with non-residents (1980).
- Corporations were allowed to issue warrant bonds (1981).
- Government phased in new regulations for issuing unsecured bonds (1983).
- Residents were allowed to float Euroyen convertible bonds (1985).
- Residents were allowed to issue Euroyen straight bonds (1985).
- Domestic commercial paper market was established (1987).

[a] Figures in parentheses denote the year in which the regulatory change took place. Sources: Ballon and Tomita (1988); Suzuki (1990); Tatewaki (1991); Hodder and Tschoegl (1993); Yamamoto (1993).

Another major regulatory change was the revision of FEFTCL in 1979, which was formally in effect in 1980. From then on, all the Japanese corporations in principle were allowed to raise funds from the overseas markets. The direct consequence of this relaxation was the expansion of offshore bond issues vis-à-vis domestic bond issues, as shown in Table 3.3 as follows,

Table 3.3: Offshore Bond Issues by the Japanese Corporations[a]

	Issue amount (billion yen)	% of total bond issue
1975 - 9	2,813	25%
1980 - 4	7,841	48%
1985 - 9	29,869	51%

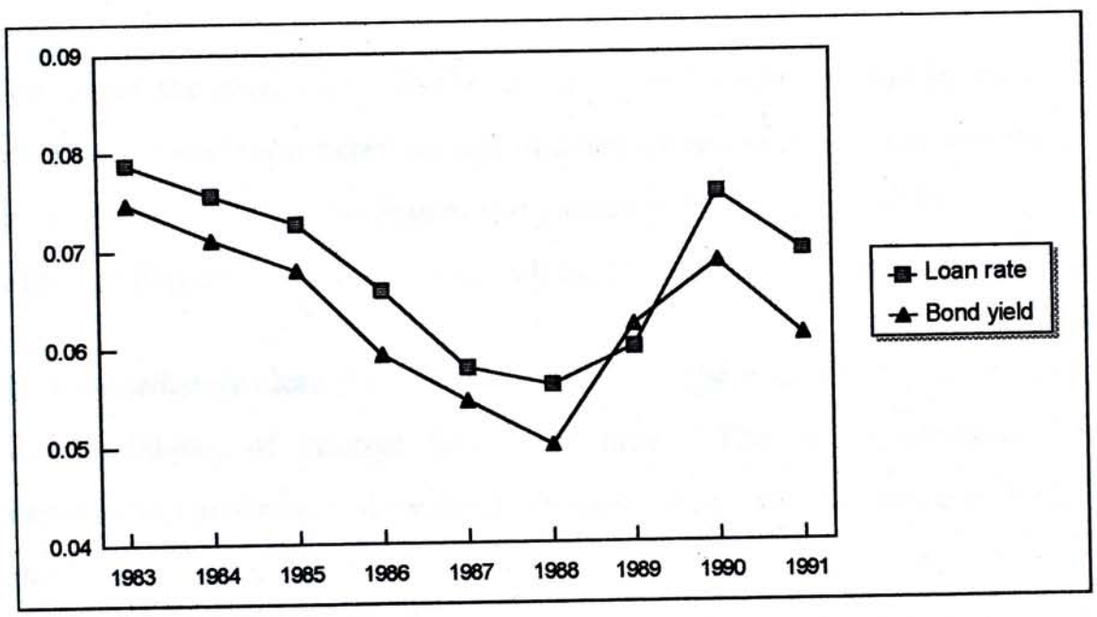
[a] Total bond issue = domestic bond issue + offshore bond issue. Source: Hodder and Tschoegl (1993).

We can see that before the revision of FEFTCL, offshore bond issues accounted for only around one quarter of the total bond issues. But with the liberalization of cross-border transactions, offshore bond issues became popular among the Japanese corporations. Further momentum was gained from the relaxations of the restriction against Euroyen convertible and straight bond issues in April and November 1985 respectively. Consequently, the amount of offshore bond issue bounced significantly during 1985 - 9 and its share became slightly more than the domestic bond issue. In fact the jump in the offshore bond issue vis-à-vis domestic bond issue might simply reflect the relative high issuing cost in the domestic market. Indeed the Ministry of Finance had estimated that the difference was roughly 50 basis points in 1990 (OECD Economic Survey (1989-90), pp.100). The gap was presumably even larger during the earlier years. This finding, together with the fact that a very large portion of offshore issues by the Japanese corporations were wound up in Japanese investors, provided a strong signal that the domestic market was inefficient (Hodder and Tschoegl (1993)).

Also important was the allowance of issuing unsecured bonds in 1983, even though the pace was slow. Before 1983, there were only two companies (Toyota Motors and Matsushita Electric) that were allowed to issue unsecured bonds in securities. Then in January 1983, an additional 9 and 23 firms were allowed to issue unsecured convertible and straight bonds respectively. In several stages over the subsequent years, these privileges were expanded gradually. By February 1987, 180 firms could issue unsecured straight bonds, and 330 firms could issue unsecured convertible bonds (Hoshi *et al.* (1989)).

Without doubt these deregulation measures had allowed the Japanese corporations to diversify their fund procurements. Specifically, these regulatory changes had opened the door for the Japanese corporations to shift their reliance from bank borrowings to bond issues. But why it was in their interests to do so? To answer this question, we may discern the relative cost of these two sources of funds. Figure 3.2 shows the relative levels of interest rate for long term bank loan (as measured by the average contracted loan rate) and the market yield of corporate bond during 1983 - 91. It is clear from the graph that except for 1989, the interest rate for corporate bond was consistently lower than the that on the long term bank loan. Thus using bonds seemed to be preferred to bank loans for financing from the consideration of interest cost.

Figure 3.2: Interest Rate on Bank Loan versus Corporate Bond Yield, 1983 - 1991



Source: Economic Statistics Annual, 1993 issue.

Moreover, the figures for the interest rate for bank loan did not represent its total interest cost due to the existence of the practice called compensating balance in Japan. When a firm make a loan from a bank, it is required to set aside a portion of its loan as time deposit with the bank (which is the compensating balance). With this requirement, the lending bank can effectively earn a higher interest rate from the same amount of loan at the expense of the borrowing firm[16]. If we also take this factor into consideration, the interest cost from borrowing from banks is even

higher than that of bond issue, which helps explain the reason why the Japanese corporations had incentive to substitute bond issue for bank borrowings.

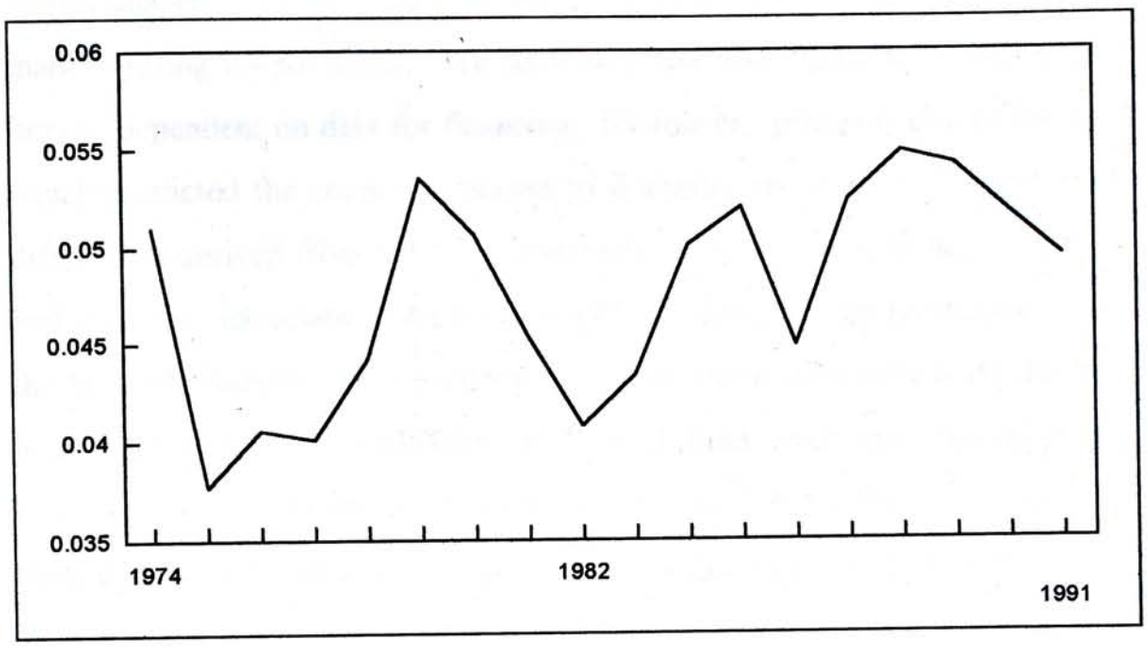
Increase in Availability of Internal Fund

Bond issue aside, the Japanese manufacturing corporations were also seen to rely more on internal reserves for financing, which was the result of the increase in the availability of internal fund in accordance with the pecking order hypothesis. Under this hypothesis, firms prefer using internal fund to external fund due to the former has a cost advantage over the latter under the condition of asymmetric information. It follows that as more internal fund is available, the firm will use more internal fund for financing. As a result, its proportion in the capital structure of the firm will increase at the expense of the external fund.

To gauge the availability of internal fund, we divide the annual flow of internal fund (which includes depreciation expenses and retained earnings) of all Japanese manufacturing corporations by their total asset. The figures are plotted in Figure 3.3. At the same time, we also plot the ratios of depreciation expenses as well as retained earnings to total assets in the graph.

It is immediately clear that albeit fluctuations, there manifested an increasing long term trend of the availability of internal fund over time. The two components of the internal funds, depreciation expenses and retained earnings, accounted for 70% and 30% respectively and it was the latter which caused the observed fluctuation of internal funds. In other words, depreciation expenses had been the major and stable source of internal fund available to the Japanese manufacturing corporations[17]. Since these expenses were the funds for financing the wearing out of physical asset, this sizeable amount of depreciation charges *per se* reflected the enormous investments in physical assets, which have long been regarded as one of the main reasons for the postwar hypergrowth of Japan.

Figure 3.3: Availability of Internal Fund, 1974 - 1991



Source: OECD Financial Statistics Part 3: Non-financial Enterprises' Financial Statements, various issues.

Our data in Section B suggests that the Japanese manufacturing corporations seemed to prefer accumulating internal reserves instead of issuing new shares in building up the base of equity capital. One of the reasons was the cost advantage of internal fund as explained above. Another major reason was related to the special requirement on new issue. As noted in the last section, all new issues were priced at the par value of the stock before 1969. But with the reorganization of the stock market and the consent of the underwriters, shares were allowed to be issued at market price instead of par value[18]. But at the same time, a new requirement was imposed which stated that a portion of the premium between the issue price and the par value of the stock had to be returned to the shareholders in the form of subsequent gratis share issues, or stock dividend. Coupled with the committed payment of dividend at par, under this requirement the dividend cost of new issue was not decreased with the practice of market price issue[19].

E. Concluding Remarks

In this chapter, we have documented the recent trend of debt usage behaviour of the Japanese manufacturing corporations. We have seen that the Japanese manufacturing corporations were heavily dependent on debt for financing. Moreover, primarily due to the government regulations which restricted the corporate access to domestic and overseas capital markets, most of these debts were derived from banks. Nevertheless, this pattern of heavy debt or bank loan reliance had changed, especially since the late 1970's. Financial deregulations took place which allowed the Japanese manufacturing corporations to use more less costly bonds for financing. At the same time, the increased availability of internal fund over time had also induced the Japanese manufacturing corporations to substitute internal funding for bank loans. The overall effect of these changes was not only the persistent reduction of reliance on bank loans but also debt ratio.

The analysis in this chapter provides the picture of the capital structure changes of a representative manufacturing corporation in Japan. Nevertheless, behind this representative portrait, there exists a great diversity in the observed capital structure choices among the Japanese manufacturing corporations. We shall take up the issue of interfirm financial heterogeneity in the next chapter.

Notes:

[1] For the reason of clarity, we shall use the term "banks" to denote "financial institutions" throughout this chapter.

[2] Caution has to be exercised in directly comparing the aggregate balance sheet ratios between Japan and the other countries due to the difference in accounting practice, namely in the treatment of reserves and provisions (Elston (1980); Suzuki and Wright (1985); Hodder and Tschoegl (1993)). The Japanese corporations are allowed by tax law to draw a portion of their retained earnings as various types of tax-deductible reserves and provisions for various reasons such as reserves for price fluctuations, provisions for bonus payments and overseas market developments. While such reserves and provisions are treated as owner's equity in western countries, they are posted as liabilities in Japan (Suzuki and Wright (1985)). As a result, the aggregate debt ratio of Japan is not comparable to that of the other countries before making appropriate data adjustments.

[3] The following table shows the various sources of supply of industrial funds during 1951 - 1970 (% of total),

	Average Over	
	1951-60	1961-70
Bank loans	46.7	44.8
Bonds	2.5	1.8
Shares	8.1	4.8
Internally generated funds	42.7	48.6

(Source: Ballon and Tomita (1988), pp.85)

We can see that bank loans dominated all sources of funds during 1951-60. However, its ratio was less than that of internally generated funds by about 4 percentage points during 1961-70. Note that the figures presented in this table refer to the *flow* of funds. Therefore, they cannot be compared to those shown in Table 3.1 which are *stock* figures.

[4] One may query that if the interest rates on government bond were kept low, then it would also be unattractive to the investors. Then who would be willing to purchase these issues? To answer this question, one needs to know the issuance procedure of government bonds. Prior to 1989, the government bonds were issued under the *syndicated underwriting system*, under which the syndicated members (including almost all the financial institutions in Japan) would purchase the unsold amount of government bonds after public offering. Therefore, even though these bonds were not attractive to general investors, there still existed a group of "stable customers": the banks in Japan.

[5] Source: Suzuki (1990), pp. 28.

[6] Before the First World War, most of bonds issued in Japan were of unsecured type. However, after the financial crises and chronic stagnation after returning to the gold standard, the number of defaults grew drastically. In view of this, there was a "clean up the bond market" movement undertaken, which resulted in the agreement made by a group of major banks, insurance companies and trust companies in 1933 (which made up the bond underwriters in Japan) that all corporate bond issues had to be collateralized and include provisions for sinking funds. But in 1979, there were two companies, Toyota Motors and Matsushita Electric, which were allowed to issue unsecured bonds domestically.

[7] Source: Economic Statistics Annual, 1993 issue.

[8] The following table shows the proportion of deposits in the financial assets of personal sector,

	% of Deposits in Total Financial Asset
1965	54%
1970	56%
1975	59%
1980	60%

(Source: Suzuki (1990), pp.28)

[9] In 1980, for the firms listed in the First Section of Tokyo Stock Exchange that had borrowings from the banks, their main banks on average provided 25% of their total bank loans. Meanwhile, there were 72% of these firms with their main banks as one of the top five shareholders.

[10] "*kei*" and "*retsu*" stand for "lineage, faction or group" and "arranged in order" respectively (Hadley (1970), pp.257). Taken together, *keiretsu* means the well-organized groupings. In Japan, *keiretsu* can be used to refer two types of groupings. The first type (which may be called *financial keiretsu*), is formed from the firms belonging to different industries. The adjective "financial" is to emphasize the prominence of banks in these groupings. The second type of grouping (which may be called *production keiretsu*) is formed by a cluster of vertically-related firms such as the manufacturer and retailer of the same product. In this chapter, we shall be exclusively concerned with the *financial keiretsu*.

[11] One of the implications of this argument is that other things being constant, the *keiretsu* firms will face a higher level of interest rate than the non-affiliated firms. It sounds as a big contrast to the usual characterization that the *keiretsu* firms can borrow from their main banks at preferential term. So far no study has been addressed to this proposition. A closer finding has been noted by Caves and Uekusa (1976). They have found that *keiretsu* firms tend to incur greater interest *payments* than the non-affiliated firms. Nevertheless, without the knowledge of loan amount, we cannot tell whether the *keiretsu* firms face a higher interest *rate* than the non-affiliated firms.

[12] Suzuki and Wright (1985) have found that, compared with non-affiliated firms, it is more likely for *keiretsu* firms to file for reorganization rather than liquidation during financial distress. Hoshi *et al.* (1990) have also found affiliations with *keiretsu* help reduce the cost of financial distress.

[13] For more details about this operation, readers may consult Pascale and Rohlen (1983). For the details of other similar operations, refer to Sheard (1989).

[14] Note however that Sheard does not make clear why the main bank is willing to take up monitoring task for the other creditors. In the case of emergence of financial intermediaries, they are willing to take up the task for the depositors because the latter will pay a service fee to the former in the form of lower interest rate received. Nevertheless, we cannot figure out how the other creditors compensate the main bank (if any) to perform monitoring for them.

[15] In fact it was the result of banks' pressures to decontrol the government interest rate. As mentioned above, banks were obliged to take up all unsold portion of government bond issues. Under the condition of controlled bond interest rate, it implied that most of the government bonds were purchased by banks. Prior to the first oil crisis, Japan experienced hypergrowth. Tax revenues were generally sufficient to meet the government expenditures so that the amount of government bond issue was small. Therefore, banks were still able to absorb them. However, after the first oil crisis, the Japanese economy slowed down, leading to the dramatic increase in the government bonds for financing the deficits (See the following table),

Amount of Government Bond Issued (100 million yen)

1966	14,218
1971	46,855
1976	229,256
1981	836,298

(Source: Economic Statistics Annual, 1993 issue)

As the enormous increase in government bond issues implied that the banks had to take up more low-yield assets, they thus pressured the Japanese government to deregulate the government bond market.

[16] The following hypothetical example serves to illustrate this point. Let us make the following denotations,

L: Desired loan amount of a firm (assume to be predetermined).
r: Annualized interest rate on loans
i: Annualized interest rate on compensating balance (assume $r > i$)

δ: Compensating balance ratio (i.e. the fraction of loans to be set aside as compensating balance)

Without the requirement of compensating balance, the firm will borrow L and incur the interest expense of rL. But with this requirement, the firm will borrow more than the amount it desires. Specifically, the actual loan amount B is determined as follows,

$$L = B - \delta B$$

or equivalently $B = L / (1 - \delta)$ (Suppose the firm knows δ before making the loans). The amount of δB is the compensating balance which will give $i\delta B$ interest income to the firm. As a result, the net interest cost of the firm (C) will be,

$$\begin{aligned} C &= rB - i\delta B \\ &= B(r - i\delta) \\ &= L(r - i\delta) / (1 - \delta) \end{aligned}$$

The last result is based on the fact that $B = L / (1 - \delta)$. Dividing both sides by L, we can obtain the express of effective loan rate faced by the firm under the practice of compensating balance (C / L), which is equal to $(r - i\delta) / (1 - \delta)$. Partially differentiating (C / L) with respect to δ we have,

$$(r - i) / (1 - \delta)^2 > 0 \text{ (since } r > i \text{ by assumption)}$$

In other words, the effective loan rate faced by a firm increases with δ. The intuition behind this result is that total interest cost incurred by a firm for borrowing a loan under the requirement of compensating balance can conceptually be divided into two parts: the interest expense on the desired amount of loan (rL) and that on the undesired loan δB (r - i). The increase in the compensating balance ratio will raise the interest expense on undesired loan, which in turn will translate into higher total interest expenses of a loan. Given the desired loan amount is constant, it implies the effective loan rate (which is defined as the ratio of total interest expenses to the desired or effective loan amount) will increase with δ.

As to the lending bank, it is obviously better off under the practice of compensating balance because it not only capture a higher return from the above firm, but also enjoy additional payoffs by lending the "forced deposits" to another firm. Suppose it does not require compensating balance on the latter firm (as we shall see, it is an innocuous assumption because its relaxation will only reinforce our conclusion), then the yield to the total amount loaned out will be,

$$(Y / B) = [(rB - i\delta B) + r\delta B] / B$$

where Y is the total interest income received from lending out B. It is composed of the net interest income earned from the first firm ($rB - i\delta B$) and the interest income received from lending to the second firm ($r\delta B$). After rearranging terms, we have $(Y / B) = r + \delta(r - i)$. Thus it is evident that the greater the compensating balance ratio, the greater the yield to the bank.

If we allow the bank to apply compensating balance indiscriminately (i.e. apply the practice to all borrowing firms at the same δ), then the expression for the yield on lending out B will be,

$$\begin{aligned}(Y / B) &= [(rB - i\delta B) + (r\delta B - i\delta^2 B) + (r\delta^2 B - i\delta^3 B) + ...] / B \\ &= r + \delta(r - i) + \delta^2(r - i) + \delta^3(r - i) + ... \\ &= r + (r - i)(\delta + \delta^2 + \delta^3 + ...) \\ &= r + [\delta(r - i)] /(1 - \delta)\end{aligned}$$

which is evidently greater than the yield under the unrealistic case that compensating balance is only required on the first firm but not the others.

Clearly, the practice of compensating balance is a means used by banks to increase loan yields at the expense of borrowing firms. A question then arises, why are the firms willing to submit to the banks? As we have seen, market sources of funds had long been either too costly or even inaccessible to the Japanese firms. As a result, bank loans were almost the only source of external funds. So long as the cost of bank loans was not that high to make the net present value of an investment project negative, firms were still willing to borrow from the banks even under the practice of compensating balance. But with a series of deregulations mentioned above, the Japanese corporations had much more alternatives than before. As a result, the use of compensating balance was decreasing in Japan (Hodder and Tschoegl (1993)).

[17] The proportions of internal fund and its components, depreciation and retained earnings, to total assets are shown as follows,

	Internal Fund	Depreciation	Retained Earning
1974	5.10%	3.46%	1.64%
1975	3.77%	3.20%	0.57%
1976	4.05%	3.14%	0.58%
1977	4.01%	3.10%	0.76%
1978	4.43%	3.19%	1.06%
1979	5.36%	3.13%	2.00%
1980	5.06%	3.19%	1.74%
1981	4.54%	3.26%	1.08%
1982	4.09%	3.41%	0.63%
1983	4.34%	3.37%	0.82%
1984	5.01%	3.50%	1.29%
1985	5.21%	3.57%	1.34%
1986	4.50%	3.69%	0.83%
1987	5.24%	3.64%	1.29%
1988	5.49%	3.59%	1.85%
1989	5.41%	3.42%	1.88%
1990	5.18%	3.44%	1.75%
1991	4.95%	3.64%	1.24%

Average	4.76%	3.39%	1.24%
Std. Dev.	0.53%	0.19%	0.48%

Two observations are readily made: First, depreciation was a much more important source of internal fund than retained earnings. The former accounted for 71.2% of total internal fund available. Second, retained earning was much more volatile than depreciation. Its standard deviation was 2.5 times of depreciation.

[18] The first company that issued new shares at market price was Nihon Gakki, a musical instrument maker.

[19] The percentage of the difference between the issue price and the par value of the stock to be returned to the shareholders was 20% (Hodder and Tschoegl (1985), pp.77).

Chapter 4: Determinants of Financial Heterogeneity among the Japanese Manufacturing Corporations: An Econometric Analysis

A. Introduction

One of the striking points about the aggregate capital structure of the Japanese manufacturing corporations is their heavy dependence on debt. As we have seen, their average debt was 0.76 during 1974 - 1991, which was very high by western standard. Nevertheless, underlying this aggregate phenomenon is a great diversity in financing practices among Japanese corporations. At one extreme, there exists some firms such as Sumitomo Light Metal Industries (a leading aluminium roller in Japan), that fund more than 90% of their assets acquisitions with debt. At the other extreme, nevertheless, we can witness many cash-rich firms such as Toyota Motor Corporation and Hitachi Ltd., which not only do not depend much on debt (indeed Toyota has zero borrowings from banks), but also have sizeable amount of surplus fund for lending to other parties[1]. In between are the firms with varying degrees of debt dependence.

Apart from differences in the practice of debt usage, Japanese corporations are also highly heterogeneous in the mix of various types of debts. Hodogaya Chemical, a chemical firm specializing in producing dyestuffs and industrial chemicals, borrows more than 70% of its total debt requirement from banks but issues no bonds. By contrast, the amount of bonds issued by Toda Kogyo, another chemical firm which leads in the manufacturing of magnetic iron oxide in Japan, accounts for more than 85% of its total debt outstanding. The firm has no request for loans from banks.

In light of these observations, one is tempted to ask: *What are the pertinent factors determining the interfirm differences in debt usage or the mix of various kinds of debt in Japan*? In this chapter we shall try to answer this question. Since the question is an empirical one, we shall resort to the econometric tools to explore the relevant determinants of interfirm financial differences in Japan, based on the insights from a

number of corporate finance studies as well as the company-level data of a sample of Japanese manufacturing corporations listed in the First Section of Tokyo Stock Exchange[2]. With respect to the mix of various kinds of debt, we shall concentrate on the choice between bank loan and bond issue since they are the most important kinds of long term debt for financing investment projects in Japan.

The organization of this chapter is as follows. In the next section, we shall look at the issue of heterogeneity of financial practices among Japanese manufacturing corporations in a greater depth with the aid of summary statistics and graphs. In Section C, we shall delineate the various arguments put forward by the corporate finance literature as well as their empirical counterparts used for econometric estimation. Section D describes the sources of data and the estimation technique to be employed in this chapter. In Section E we shall present the findings of the estimations and discuss their implications. Then the last section will conclude the present chapter.

B. Statistical Evidence of Financial Heterogeneity of Japanese Manufacturing Corporations

To put ourselves into perspective and to supplement the piecemeal "evidences" shown in the previous section, we have prepared some summary statistics and graphs to illustrate the financial heterogeneity among Japanese manufacturing corporations. Table 4.1 shows the mean (figures in the first row of each item) and the coefficient of variations (CV; bracketed figures in the second row of each item) of debt ratio as well as various liability ratios during the period 1982 - 1991. The calculations of these figures are based on the data of our sample which consists of the manufacturing corporations listed in the First Section of Toyko Stock Exchange. Details of the sample will be depicted in Section D.

Table 4.1: Heterogeneity of Debt Ratio and its Major Components among the Japanese Manufacturing Corporations, 1982 - 1991[a]

	1982	1985	1988	1991	1982-91
Debt	0.60	0.58	0.56	0.55	0.57
	(0.36)	(0.35)	(0.32)	(0.32)	(0.34)
Bank loan	0.26	0.24	0.19	0.18	0.21
	(0.74)	(0.83)	(0.91)	(0.82)	(0.85)
Bond	0.03	0.06	0.09	0.12	0.07
	(1.39)	(1.16)	(0.96)	(0.78)	(1.06)
Ratio of long term bank loan to long long term debt	0.74	0.55	0.42	0.37	0.52
	(0.45)	(0.75)	(0.96)	(0.99)	(0.79)

[a] The calculations of the figures are based on the data of our sample. The first and the second row (bracketed figures) of each item represents respectively the mean and coefficient of variation of the item among all firms in a particular year. Except for the ratio of long term bank loan to long term debt, all items are expressed in proportion of total assets.

Several familiar observations pertaining to the mean levels can readily be noted. First, debt ratio was decreasing over time. In 1982, debt financed more than 60% of asset acquisitions by Japanese manufacturing corporations. Nevertheless, it fell steadily to 58% in 1985 and then to 55% in 1991. Second, the ratio for bank loan also followed the general downward trend of debt ratio, even though it was still the most significant liability component throughout the whole period. Third, exactly contrary to the case of bank loan, the ratio for bond issue was increasing from modestly more than 3% in 1982 to 12% in 1991. Fourth, as reflected by the plummeting ratio of long term bank loan to long term debt (which is defined as the sum of long term bank loan and bond outstanding)[3] from 74% in 1982 to 37% in 1991, the Japanese corporations were evidently shifting their reliance from private source of debt to the public source. Note that we deliberately exclude short term bank loan in the calculation of this ratio because in the problem of the

choice between bank loan and bond issue, corporations are presupposed in need of long term finance as bond issue is a kind of long term debt. As a result, short term bank loan is irrelevant and its inclusion will only blur the real picture of actual corporate choices of long term fund.

What is more pertinent to our analysis, nevertheless, is the different mix between debt and equity as well as between bank loans and bond issue chosen by different corporations, which are captured by the various CVs. On average CV for debt ratio in the period was 0.34. That means on average the standard deviation of debt ratio was equal to 34% of its mean level, showing a high degree of heterogeneity of debt usage. The CVs for all other liability components, however, were even higher. For instance, the value of CV for bank loan was 0.85 for the whole period 1982 - 91, which was 2.5 times of that of debt ratio. The CV for bond ratio was the greatest, even though it was decreasing over time which was very likely due to the gradual relaxation of restrictions imposed on the eligibility of bond issue, especially the unsecured bonds and bonds issued overseas. As to the choice between long term bank loan and bond issue, its variation was both great and intensifying among the Japanese corporations, as indicated respectively by the CV of 0.79 on average as well as its more than doubling of its value from 0.45 to 0.99 in ten years time.

Having examined financial heterogeneity in a general manner, we now turn our attention to the interindustry financial differences. The need for doing so is that generally observed financial heterogeneity may only reflect a historical accident as implied by the original Modigliani and Miller model. Under the assumption of perfect capital market, debt and equity or various sources of funds are perfect substitutes such that the mix among them would be immaterial to the firm value. As a result, firms may simply choose any mix by any criterion, and thus the observed diversity in financing practices is only a historical accident beneath which no regularity can be detected. Nevertheless, if we can find that there do exist *marked* and *persistent* financial differences among firms from different industries, then it is not likely accidental. Instead we should expect that there are some

economic forces at work and thus our efforts to figure out the factors affecting interfirm financial differences can be warranted.

Table 4.2 shows the average debt ratio of the firms coming from different industries during 1982 - 1991. The industrial classification of a firm is based on the scheme of *Daiwa Industrial Classification* and the data of all manufacturing firms are used for calculations. The industries listed in the table are ranked and categorized by their debt ratios. It is evident that though intragroup comparison reveals little variations in interindustry debt usage, pairwise comparison between any two groups shows the

Table 4.2: Interindustry Differences in Average Debt Ratio over 1982 - 1991[a]

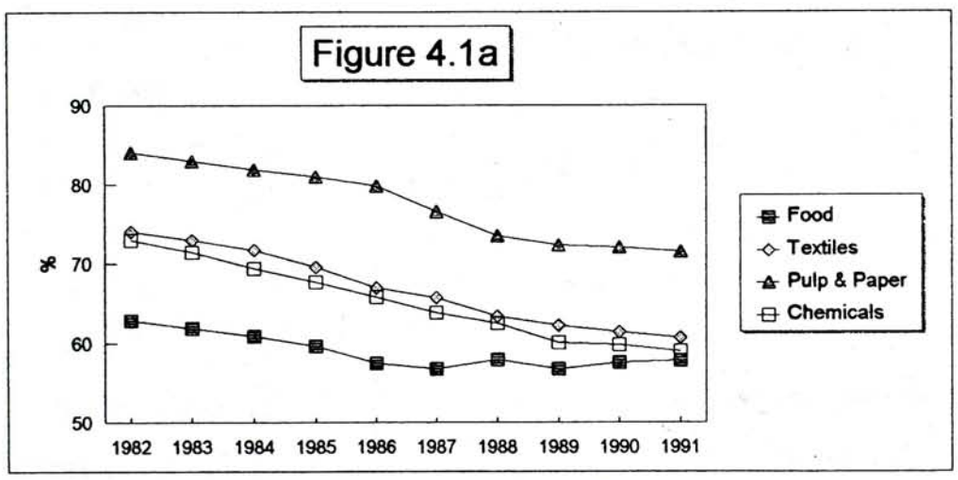
Industry	Ratio
Group I (Debt Ratio ≥ 0.70)	
Petroleum & Coal Refining	0.83
Iron & Steel	0.79
Pulp & Paper	0.78
Non-Ferrous Metal	0.77
Group II (0.60 ≤ Debt Ratio < 0.70)	
Textiles	0.67
Rubber	0.66
Metal	0.66
Chemicals	0.65
Transportation Equipment	0.65
Glass & Ceramics	0.63
Group III (0.50 ≤ Debt Ratio < 0.60)	
Electrical Machinery	0.59
Food Processing	0.59
Machinery	0.59
Precision Equipment	0.55
Overall	0.66

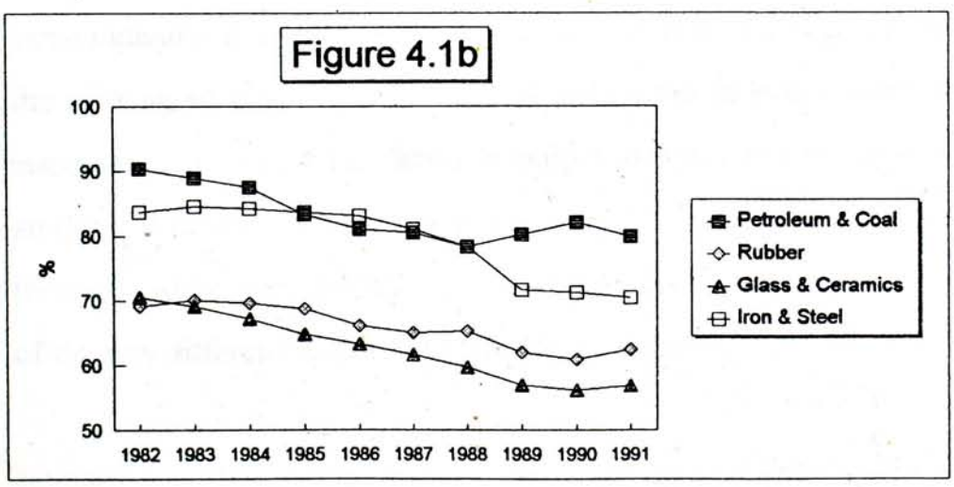
[a] Source: Analyst Guide, Daiwa Securities Research Institute, various issues.

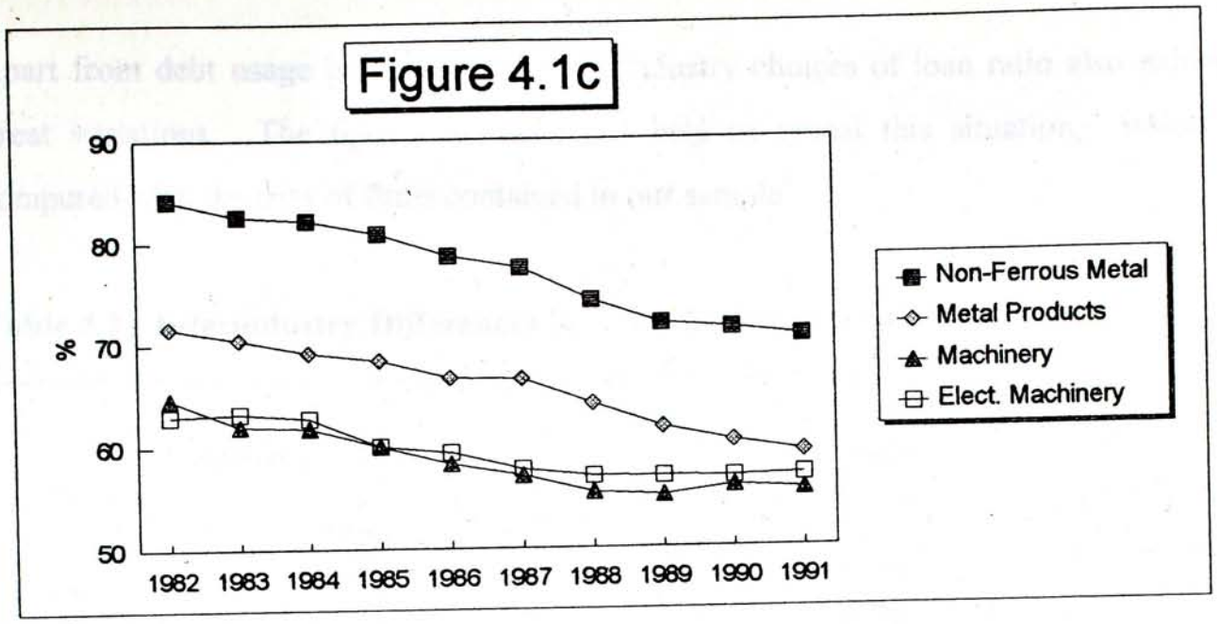
difference could be significant. It is particularly the case if we compare the industries from Group I to those of Group III. The difference in debt ratio ranges from 18 percentage points (non-ferrous metal versus electrical machinery) to 28 percentage points (petroleum & coal refining versus precision equipment).

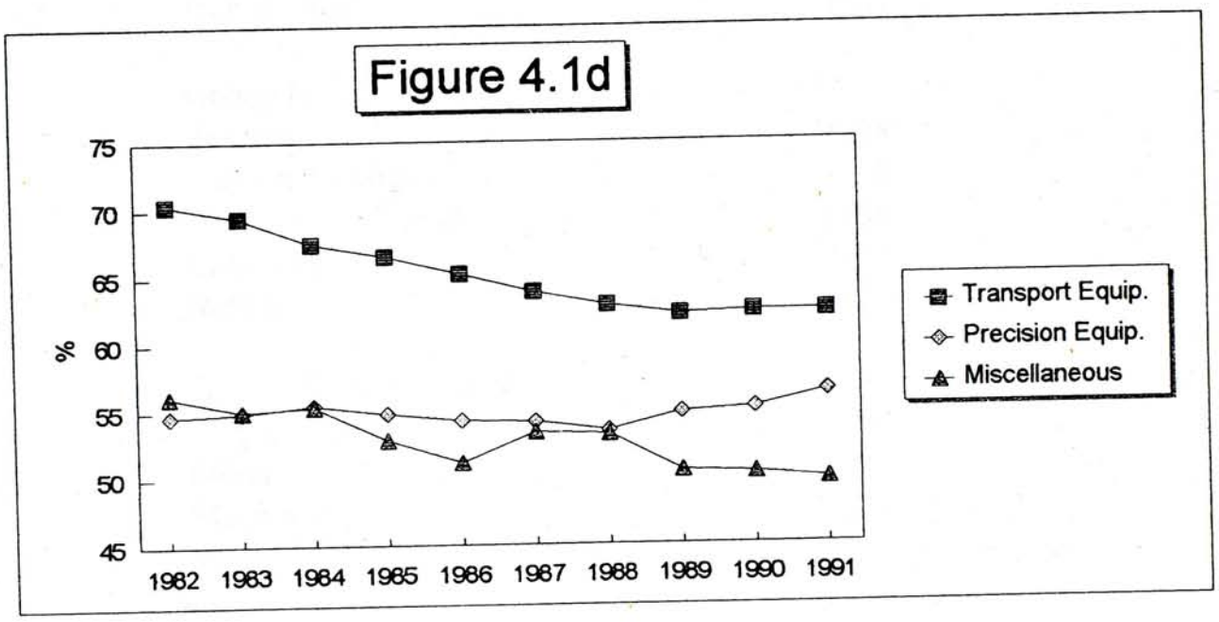
Apart from the marked differences in debt ratios (at least between some of the industries), the relative use of debt by different industries persisted over the whole period of 1982 - 1991. This can be vividly illustrated in the Figure 4.1 shown below. We present the data in four graphs instead of one is simply due to the reason of achieving visual clarity. Groupings of industries are based on their order shown in the *Daiwa Industrial Classification*, and thus not the same as the one shown in Table 4.2.

Figure 4.1: Interindustry Differences in Debt Ratio, 1982 - 1991









Source: Analyst Guide, Daiwa Securities Research Institute, various issues.

Every point in a graph represents the average debt ratio among the firms belonging to the same industry in a particular year. It is clear from each graph that, few exceptions aside, the ranking of industries in terms of debt ratio at every point of time is the same. For instance, in Figure 4.1a, firms in pulp and paper industries used consistently the largest amount of debt in percentage terms whereas those from food processing used the lowest throughout the period 1982 - 1991. Equivalently it means that the pattern of relative use of debt by different industries persisted over time.

Apart from debt usage behaviour, the interindustry choices of loan ratio also exhibited great variations. The figures in Table 4.3 help to reveal this situation, which are computed with the data of firms contained in our sample[4].

Table 4.3: Interindustry Differences in Average Loan Ratio, 1982 - 1991[a]

Industry	Ratio
Group I (Ratio ≥ 0.60)	
Petroleum & Coal Refining	0.79
Pulp & Paper	0.70
Iron & Steel	0.61
Group II (0.50 ≤ Ratio < 0.60)	
Textiles	0.58
Glass & Ceramics	0.56
Non-Ferrous Metal	0.56
Chemicals	0.52
Rubber	0.51
Group III (Ratio < 0.50)	
Transportation Equipment	0.49
Metal	0.48
Machinery	0.48
Precision Equipment	0.41
Food Processing	0.40
Electrical Machinery	0.34

[a] The calculations of the figures are based on the data of our sample of firms

Just like the case of Table 4.2, we rank and categorize the industries in accordance with the values of their ratios so that the differences can be made more visible. Again the variations between groups are marked. When we compare the industries from Group I to those in Group III, the difference ranges from 12 percentage points (iron & steel versus transportation equipment) to 35 percentage points (petroleum and coal refining versus electrical machinery). Intragroup comparisons, however, also manifest great contrasts, even though it depends on the fineness in the categorization. For instance, the range of

the ratio in Group I is 18 percentage points. The corresponding figures for Group II and III are 7 and 15 percentage points respectively.

Figure 4.2 are intended to demonstrate that the variations in the loan ratio among industries were persistent. Again we present the data in four graphs for visual clarity and the grouping of industries are in accordance with the order shown in the *Daiwa Industrial Classification*. It is clear that though the pattern is not as apparent as the case of debt ratio, we do find the differences in the loan ratio are persistent, as least for some industries. For example, in Figure 4.2a the firms from pulp & paper industries had the highest loan ratio consistently over the firms from other three industries throughout the period 1982 - 1991. The same is also applied to the firms in petroleum and coal refining in Figure 4.2b (except for 1982).

Interindustry Differences in Loan Ratio, 1982 - 1991

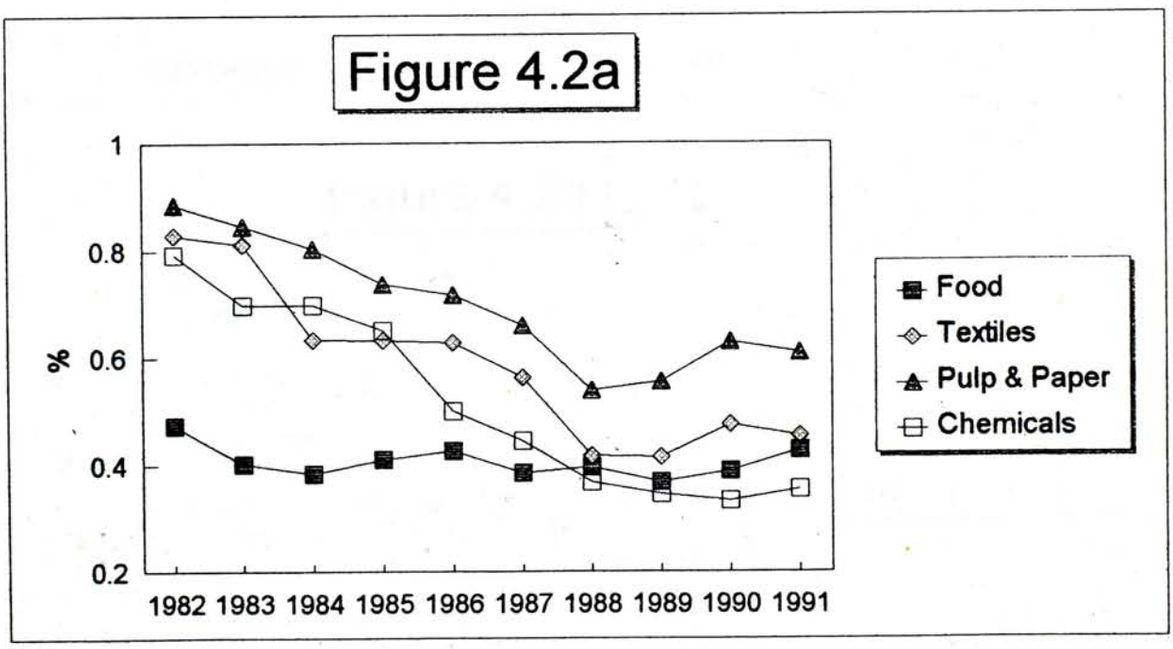


Figure 4.2b

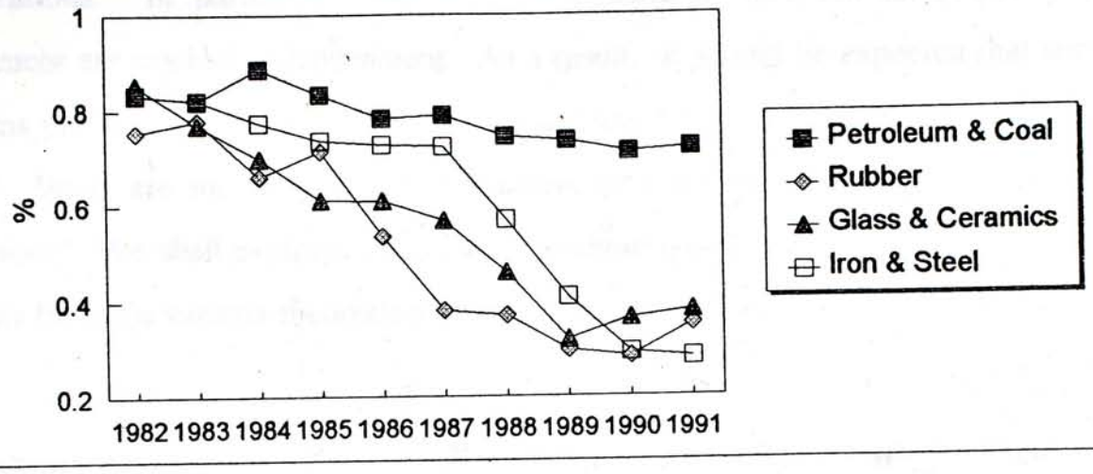


Figure 4.2c

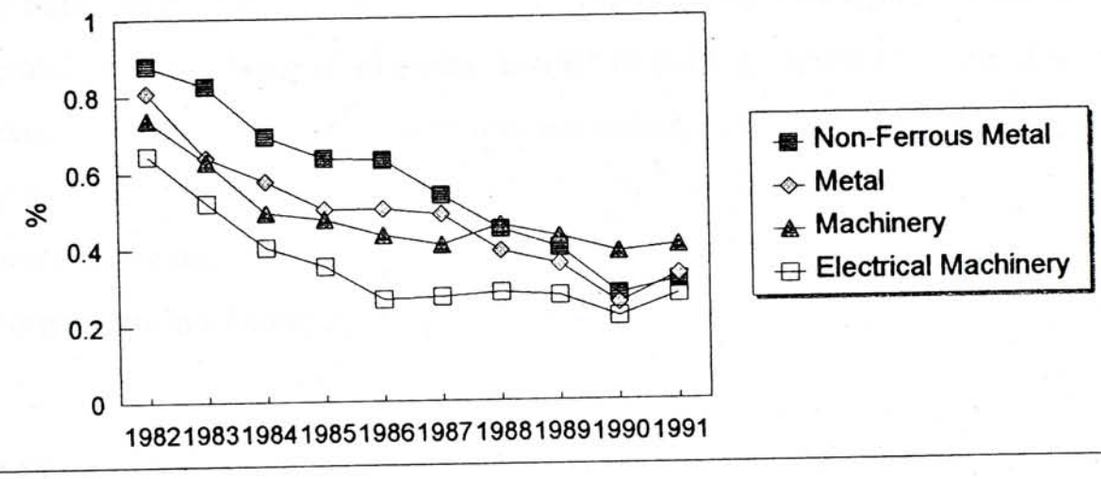
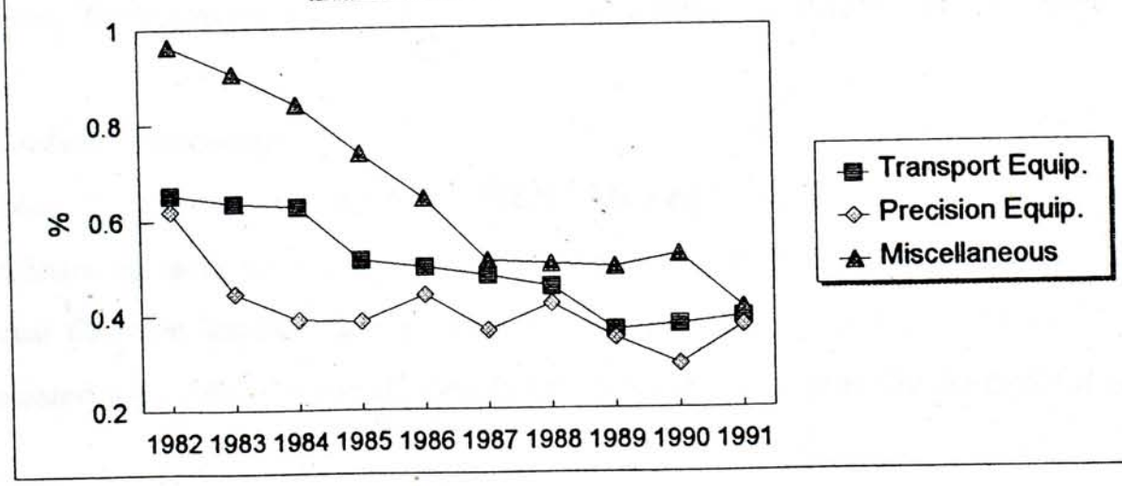


Figure 4.2d



Source: Analyst Guide, Daiwa Securities Research Institute, various issues.

We have seen that there exist great financial variations among the Japanese manufacturing corporations. In particular, we have demonstrated that the interindustry financial differences are marked and persistent. As a result, it should be expected that some types of firms prefer using debt to equity or using bank loans to bond issues. Who are these firms? What are the proper categorizations of firms for discriminating their financial behaviour? We shall explore the answers to these questions in the next section with the insights from the various theoretical and empirical studies in corporate finance.

C. Factors Affecting the Debt-Equity and Bank Loan-Bond Issue Choices

In fact the nature of the choice of debt versus equity is different from that of bank loan versus bond issue. The former refers to the choice of security type whereas the latter is concerned with the choice of provider (private or public), given the type of security (in our case it is debt). Therefore it is not astonishing to find that these two choices are driven by different sets of considerations. We shall divide the discussions into two parts, pertaining to the determinants of these two choices respectively. Since we have reviewed these arguments in Chapter 2, we shall be brief on them in the following discussions.

Debt-Equity Choice

We shall categorize the arguments in six groups, pertaining to the considerations of taxation, bankruptcy cost, agency cost, pecking order hypothesis, and the others.

Tax-related Arguments

As noted by Modigliani and Miller (1963), tax deductibility of interest payments makes debt financing more favourable than equity financing. It is so because tax-deductibility of interest payment implies that the effective interest rate, and hence the effective cost, associated with debt is reduced. The lower the cost, the higher the demand for debt will be.

Two implications spring up from this argument. First, if a corporation faces a higher corporate income tax rate compared to the others, then it will have a greater incentive to use debt. The reason is that greater tax rate means tax savings from a given amount of interest payments increases, which lowers the effective interest rate from debt. Second, as pointed out by DeAngelo and Masulis (1980) and Dotan and Ravid (1985), non-debt tax shields could act as substitutes for interest deductions since the former will increase the probability for a firm to be tax-exhausted, a situation in which the amount of such tax shields is so large that the firm need not pay any tax at all. As a result, the benefit of the aforementioned tax savings from tax deductibility of interest payments will vanish. Therefore if a tax system allows for certain types of non-debt tax shields, we should expect that the greater the amount of non-debt tax shields, the more likely that a firm will become tax-exhausted, and thus the less debt will be used.

To apply these propositions to the case of Japan, we need to discern her tax law. Indeed under its stipulations, differential corporate income tax rate could arise from one of the following three situations,

(1) If the amount of paid-in capital of a corporation is less than 100 million yen, then the first 8 million of its taxable income will be liable to the corporation tax rate which is lower than the normal rate. Nevertheless normal tax rate will be applied to any amount in excess of 8 million yen[5].

(2) If a corporation is a family corporation, which is defined as a firm with more than 50% of its shares held by not more than three shareholders or other persons connected with them (e.g. their family members), then it will be liable to additional corporate tax rate on its retained earnings[6].

(3) If a corporation enjoys a capital gain from the sales of a land possessed for five years or less, then it will be subject to a surtax on capital gains. Higher rate will be applied to the case where the ownership period of the land being sold is two years or less[7].

In light of these stipulations, our first proposition implies that a "small" firm falling to the situation (1) will use less debt than the others. Meanwhile, we should also expect that the family corporations or the firms with taxable land sales as defined in situation (3) will use more debt than the others as its liability to higher tax rate implies greater tax savings for using debt. Nevertheless, our analysis will not cater for these cases for two reasons. First, our sample does not cover the types of firms mentioned in (1) and (2). It is the case because, as noted before, our sample is drawn from the manufacturing corporations listed in First Section of Tokyo Stock Exchange. These firms are among the largest in Japan, while both family corporations and firms with paid-in capital 100 million yen or less are small in scale. Second, as to the situation (3), since we do not have the data of land transaction nor the ownership period, we are not able to tell whether a corporation is subject to a greater tax rate during a given period.

With respect to non-debt tax shields, the following three items are tax-deductible as permitted by the tax law in Japan,

(1)' Direct expenses

The major items under direct expenses are depreciation expense and research and development expense. As mentioned in the previous chapter, Japanese corporations prefer employing the declining-balance method for calculating depreciation so as to achieve greater present tax savings. At the same time, on top of normal depreciation, some corporations (such as those located in underdeveloped areas or those belonging to designated industries) can charge for special depreciation which can also be deducted from gross profits for the calculations of taxable income.

(2)' Tax credit for research and development

In addition to deducting from the gross profit directly, the expense for research and development may also earn a firm a tax credit. To get the credit, the amount of the expense in the current accounting period must be greater than the largest of such expense in any preceding accounting period since 1966[8].

(3)' Various tax-deductible reserves

Corporations in Japan are allowed to draw some of their retained earnings as reserves for various purposes which are tax-deductible. Examples include reserves for bad debt, price fluctuation, bonus payments and retirement allowances.

In order to test the effect of non-debt tax shields on the debt usage, we shall put the variable (Depreciation expense + R&D expense + Tax-deductible reserves)/Total asset into the our econometric model. Indeed this variable is corresponding to the items (1)' and (3)' above. As to tax credit for research and development expense, we are not able to quantify it since doing so requires the data of such expense since 1966 while our data dates back to 1982 only.

Bankruptcy Cost-related Arguments

The central thrust of bankruptcy cost argument is that the likelihood of bankruptcy will check the use of debt by a firm. More debt means greater interest expenses, which implies that the increased probability for a firm to be unable to cover the interest expenses with operating income. When it occurs, the firm will experience financial distress or even become bankrupt. As bankruptcy could mean reduction in real wealth of the shareholders, they will balance the benefits of using debt (e.g. tax savings) with the expected cost of bankruptcy to obtain the optimal mix.

We can derive two propositions from the above argument. First, the higher the cost of bankruptcy, the greater the incentive for a firm to avoid its happening and the lower the

debt will be used. Using this proposition to explain the interfirm heterogeneity in using debt entails the demonstration that, other things being equal, some types of firms face a lower cost of bankruptcy than the others. What are these firms and why?

As mentioned in the previous chapter, conceptually bankruptcy cost can be divided into two components: direct cost and indirect cost. Direct cost refers to the out-of-the-pocket legal and administrative expenses associated with the bankruptcy process. These expenses, however, have been found to be insignificant relative to the prebankruptcy market value of the bankrupt firms (Warner (1977); Weiss (1990)). Moreover, there is no reason *a priori* to suspect that some kinds of firms will face a lower direct cost than the others. Thus we do not expect that the direct cost of bankruptcy plays important role in the debt-equity choice.

If direct cost of bankruptcy is immaterial and if bankruptcy cost does affect the debt behaviour, then indirect cost should matter. Indirect cost of bankruptcy refer to the implicit costs arising from financial distress, which can manifest in many ways. For example, a financially-distressed firm may have to forgo profitability investment projects due to its inability to solicit new funding, or experience reduction in sales because the customers may suspect that the availability of after-sales services is in doubt.

Then what types of firms are subject to a lower indirect cost of bankruptcy in Japan? Hoshi *et al.* have conducted an empirical study on this subject (1990). The major finding of their study is that, after experiencing financial distress for two consecutive years (where financial distress is defined as the ratio of operating income to interest expense is less than 1), the corporations belonging to one of the major *keiretsu*[9] outperform the non-affiliated firms in terms of greater amount of investment and sales. The ultimate basis of their argument is that the root of this indirect cost of financial distress is the difficulty of renegotiating financial claims. It is especially true when there are a large number of creditors because of the free rider problem (an individual bears the full cost of

renegotiation, but shares the benefits with other creditors (Bulow and Shoven (1978); Gertner and Scharfstein (1990)) and the information problem (bondholders may not be well-informed about the firm to decide whether to grant financial relief or even to supply new capital). As a result, the *perceived* likelihood of the firm ceased to be a going concern is increased, which may lead to other side effects that in turn raises the indirect cost of financial distress further or even hastens the collapse of the firm. For example, the firm's suppliers may not be willing to extend trade credit. It is particularly acute to the case of Japan since, as we have seen, Japanese corporations depend considerably on trade credit for financing (at least on the gross basis). At the same time, the firm's customers may vote with their feet as its ability to honour its warranties is questionable.

In spite of this, as argued by Hoshi *et al.*, if a firm is a member of major *keiretsu*, then the above problems are likely to be less severe. Recall from the previous chapter that the salient characteristics of the relationship between a firm with its main bank within a grouping are that the latter serves as the largest creditor and one of the prominent shareholders of the former. As the stakeholders are relatively concentrated, the free-rider problems should be less prevalent. Moreover, as there is a smooth flow of information between the main bank and the firm through the various arrangements such as regular meetings in president councils and the transfers of directors to the firm, the asymmetric information problem would be less acute. Also since the *keiretsu* firms have well-established trading ties with other member firms, the latter will be more willing to extend trade credit or even purchase from or sell to a financially-distressed member firms at preferential terms in expectation that the latter will do the same when the former are in financial troubles[10].

This study of Hoshi *et al.* has a direct bearing on our analysis because in principle we can identify a group of firms that will incur less cost during financial distress: the member corporations of *keiretsu*. According to our proposition, since such corporations face a

lower cost in financial distress due to group affiliations, we would expect that they will use more debt compared with the non-affiliated firms.

To make the testing of this implication operational, there are two problems that needs to be resolved: First, how to identify *keiretsu* members? It is a critical question because the analytical findings are sensitive to the definition of membership in such groupings. In fact the *keiretsu* membership is not defined in the black-and-white manner. There is no formal list of corporate membership kept by each grouping. Studies on *keiretsu* (including those by Hoshi *et al.*) depend either directly or indirectly[11] in the list compiled in a publication called Keiretsu no Kenkyu. However, as pointed out by Hadley (1984), there are several misclassification errors in the list[12], which makes the validity of the results of the studies are in doubt.

In face of this problem, we have essentially two options: using the list of Nagatani (1984) with adjustments based on the comments by Hadley (1984); or simply denoting the members of president councils in each major *keiretsu* only as corporate members of these groupings. The second option is justifiable because, unlike the case of general membership, the list of membership in the president council is well-defined and kept by each grouping. Nevertheless, the cost of doing so is another misclassification error: the misidentification of general member corporations of major *keiretsu* as non-affiliated firms, which is probably more severe than the error of the inclusion of non-member corporations into such groupings. Therefore, we shall go for the first option in the definition of *keiretsu* membership.

Once the first problem is overcome, the second one emerges: How to determine the fineness of categorization of firms for our estimation purpose? Should it be a simple dichotomy of affiliated firms versus non-affiliated firms as done by Hoshi *et al.*? Or should the members of different groupings be demarcated?

In fact the fineness in the firm categorization depends very much on the underlying hypotheses to be tested. If we simply want to know the difference in debt usage behaviour between affiliated firms and the non-affiliated firms, then a simple dichotomy will be sufficient for our purpose. But if our interest lies in the differential behaviours of firms from different groupings, then a finer categorization will be required.

Table 4.4, which shows the debt ratios of various categories of firms by group affiliations during 1982 - 1991, may give us clues to resolve this problem. As indicated in the last two rows in the table, we do observe that there were differences on debt ratios between affiliated and non-affiliated firms, ranging from 5 to 8 percentage points. With respect to the intergroup differential, we do not find marked variations among groupings. Nevertheless, we do find differences in debt ratios between council members and the non-council members in four out of the six groupings (Mitsubishi, Mitsui, Sumitomo and Fuyo). In the first three cases (the *keiretsu* with zaibatsu origins), their council members consistently used more debt than their non-council members. However, the converse is observed for the Fuyo Group. Thus we should expect that group affiliations could have differential effects on council members and non-council members.

In view of these observations and our argument, we shall test the effects of industrial groupings on debt equity ratio by inserting two dummy variables for the council members and non-council members of *keiretsu* respectively. The testing of the significance of both variables helps determine whether the *keiretsu* affiliations help lower bankruptcy cost, and hence increase debt-equity ratio. Meanwhile, the testing of the significance of the difference between the coefficients of these dummies gives us hints about the possible differential effects of keiretsu affiliations on council members and non-council members.

Table 4.4: Debt Ratios of *Keiretsu* Firms versus Non-Affiliated Firms[a]

Groupings	1982	1985	1988	1991
Mitsubishi (31)	0.67	0.62	0.58	0.58
Council members (11)	0.82	0.78	0.71	0.68
Non-council members (20)	0.58	0.56	0.51	0.54
Mitsui (35)	0.63	0.60	0.58	0.57
Council members (12)	0.76	0.74	0.67	0.66
Non-council members (23)	0.56	0.53	0.53	0.53
Sumitomo (36)	0.64	0.62	0.59	0.57
Council members (8)	0.76	0.73	0.70	0.68
Non-council members (28)	0.61	0.58	0.56	0.54
DKB (27)	0.69	0.67	0.63	0.63
Council members (19)	0.72	0.70	0.66	0.64
Non-council members (8)	0.64	0.61	0.58	0.59
Fuyo (24)	0.66	0.64	0.57	0.57
Council members (8)	0.59	0.56	0.49	0.51
Non-council members (16)	0.69	0.69	0.60	0.61
Sanwa (31)	0.60	0.58	0.57	0.56
Council members (23)	0.60	0.59	0.57	0.55
Non-council members (8)	0.60	0.56	0.56	0.57
All *keiretsu* firms (179)	0.64	0.62	0.58	0.58
Non-affiliated firms (178)	0.56	0.54	0.53	0.51

[a] The list of council members is obtained from *Industrial Groupings of Japan - The Anatomy of the "Keiretsu"*, Dodwell Marketing Consultants, Tenth Edition, 1993. The list of non-council members is drawn from the appendix of Nagatani (1984), after taking the comments of Hadley (1984) into account. The debt ratios are calculated based on our sample data. Figures in parentheses refer to the number of firms belonging to a particular category in our sample.

There is another type of indirect cost associated with bankruptcy. When a firm is bankrupt, then its assets will be liquidated so as to meet its debt obligations as much as possible. Nevertheless, the eventual amount received by creditors depends on the

collateral value of the assets being liquidated which in turn depends on the various attributes of these assets. They are liquidity, tangibility (Myers (1983); Long and Malitz (1985)) and firm-specificity (Williamson (1985)). The more liquid the assets (such as bank deposits or marketable securities), the lower the cost will be incurred in selling it, and thus the receipt of the creditors will be higher. Likewise, tangible (e.g. equipment or land holdings) or non-firm-specific assets are of more value to creditors than nontangible or firm-specific asset (such as goodwill) under bankruptcy since the value of the latter will dissipate when a firm ceases to be a going concern while the former will not. Based on these considerations, we would expect that the creditors of a firm with less liquid or tangible assets or with more firm-specific assets will demand a higher premium for lending, which constitutes the other type of indirect cost associated with bankruptcy.

To cater for these effects, we shall place two explanatory variables into the regression equation: the ratios of liquid assets and tangible assets to total assets of a firm. As to the case of firm-specificity, while it is a useful theoretical concept to understand financial behaviour, it is hard to be measured and thus compared among firms. As a result, we shall not consider this effect in our regression equation.

So far we concentrate on elaborating the first implication of bankruptcy cost argument. We now turn to the second implication: Given the possible costliness of bankruptcy or financial distress, then the greater the bankruptcy risk a firm is subject to, the less the amount of debt it will use. Underlying this proposition is the fact that, apart from the level of debt usage, there are many factors affecting the bankruptcy risk of a firm. Then we would expect that debt will be used to balance these factors so as to control the level of bankruptcy risk. The question is, what are these factors?

As financial distress occurs when the operating income is not sufficient to meet the interest payments, it follows that the level of operating income matters. The greater the level of operating income, the lower the probability of the occurrence of financial distress. Also

relevant is the business risk, or the perceived variance of operating income in the current period, since it may influence the likelihood of interest payments not being covered. The other and a widely-cited factor is firm size (Smith and Warner (1979); Friend and Hasbrouck (1988); Crutchley and Hansen (1989); Chiarella *et al.* (1992)). The rationale is that the larger the size of the firm, the more diversified portfolio it can maintain, and thus the lower the bankruptcy risk.

Apart from lowering the cost of financial distress, affiliations with *keiretsu* also lowers the probability of being bankrupt. As shown in the last chapter, there are a number of incidents in which the banks within the groupings bailed out the group firms which were at the brink of bankruptcy[13]. Thus we should expect that this function of lowering the bankruptcy risk would reinforce the reduction in the cost of financial distress which makes the *keiretsu* firms use more debt than the non-affiliated firms.

To test these effects on debt usage behaviour, we insert the following variables in our model. The first one is the ratio of operating income to total asset, which measures the level of operating income. With respect to the perceived operating risk, we shall follow the practice of literature to use the historical volatility of operating income as proxy although the results are mixed in previous empirical studies[14]. Lastly, we shall use the log annual sales volume to gauge the size of a firm[15].

Agency Cost-related Arguments

One of the bases of agency cost argument is the possible conflict of interests between shareholders and debtholders, which would ultimately raise the cost of debt incurred by the firm. The classical example of such conflict comes from the study by Jensen and Meckling (1976). Under the condition of limited liability, shareholders of a firm will always have the incentive to undertake risky projects. It is the case because when the project is successful, then the shareholders will capture most of the gains. By contrast, if

it fails, the provision of limited liability will bound the loss suffered by the shareholders. Equivalently what this means is that the firm's creditors can only get fixed payments if the project succeeds but bear most of the loss when if it fails. As creditors are assumed to know the shareholders' incentive to undertaking risky projects, they will require a higher premium for lending.

Such a conflict of interests between debtholders and shareholders arise because they are different parties. If we jump to the extreme that when the same party takes the role of debtholder and shareholder simultaneously, then the aforementioned conflict of interest will surely vanish. What this implies is that the larger the amount of shares are held by the firm's creditors, the less acute the problem of the conflict of interest will be, and more debt will be used by the firm.

To capture this effect, we introduce the variable of the proportion of a firm's shares held by financial institutions and other corporations into our regression equation. The reason for taking the shares held by corporations into consideration is simply because such corporations could be the providers of trade credit to the firm.

Pecking Order Hypothesis

Mayer (1990) has found that one of the salient stylized facts about the aggregate corporate financing is that internal fund is the most significant source of funds in many major industrial countries (including Japan). It makes sense because internal fund has a cost advantage over the external fund under asymmetric information, which is a prevalent situation characterizing most of the financial relationships. As a consequence, firms will have preference on internal fund over external fund, resulting in the observed general predominance of the former.

The direct implication of this argument on the debt-equity choice is that the greater the availability of internal fund, the more the firm will use internal fund. Since internal fund is

one form of equity capital, increased availability of internal fund will encourage more equity usage, and thus the debt ratio will be lower. In other words, variations in the availability in internal fund among firms will lead to the different degree of debt usage.

We shall use the variable (Net income/Total asset) to gauge the availability of internal fund. Since this also measures the net profitability of a firm, it follows that the more the profitability of a firm, the less the debt equity ratio will be since it has more internal fund available for financing capital investments.

Other Explanatory Variables

Apart from the above variables, we shall also insert a dummy for the firms belonging to the petroleum and coal refining industry since as reviewed in the last section, these firms on average have the highest debt ratio compared with the firms in other industries. Therefore, we suspect there may be some industry-specific effects which may not be captured by the above arguments.

To conclude this subsection, we present all arguments, their proxy explanatory variables and the expected effects on leverage that we have discussed in Table 4.5.

Table 4.5: Determinants of Debt-Equity Choice

Factors	Proxy Variables	Effect on Debt
- Non-debt tax shields	(DEP+R&D+RES/TA)	-
- Bankruptcy cost	G1	+
	G2	+
	(TAN/TA)	+
	(LA/TA)	+
	(OPER/TA)	+
	(CVOPER)	-
	SIZE	+
- Agency cost	(BCSH/SHARES)	+
- Pecking order	(NET/TA)	-
- Others	I	+

Explanatory notes for Table 4.5:

DEP:	Depreciation expense.
SIZE:	Log of sales.
R&D:	Research and development expense.
RES:	Tax-deductible reserves.
TA:	Total asset.
G1:	Dummy variable which equals 1 if the firm is a council member of any group; 0 otherwise.
G2:	Dummy variable which equals 1 if the firm is a non-council member of any group; 0 otherwise.
TAN:	Tangible assets.
LA:	Current assets.
OPER:	Operating income.
CVOPER:	Coefficient of variation for (OPER/TA).
BCSH:	Number of shares held by banks and corporations.
SHARES:	Total number of shares issued by a corporation.
NET:	Net profit.
I:	Dummy variable which equals 1 if the firm belongs to petroleum & coal refining industry; 0 otherwise.

Bank Loan-Bond Issue Choice

The bank loan-bond issue choice in essence is a choice between private and public debt. Mackie-Mason (1990) has set out a framework for analyzing the factors affecting this choice. As mentioned in the last chapter, the basic argument is that, under asymmetric information, what governs the use of public debt is the amount of lemon premium required by the outside investors, which in turn depends on the amount of information possessed by these investors about the firm. The less information the investors have, the greater the lemon premium they demand, and the higher the cost of public debt will be. As a result, firms will tend to use less public debt but more private debt. By contrast, if the investors are well-informed regarding the future prospects of a firm, then they will require a lower premium and hence lower cost of public debt. Therefore we expect that the firm will tend to use more public debt but less private debt.

The above argument presupposes the lemon premiums required by banks are the same across firms so that all variations in the choice of private debt versus public debt can be explained by the differential information possessed, and hence differential premiums

demanded, by investors with regard to different firms. Nevertheless, differential access to the firms' private information by banks could also exist. In other words, the differential access to private information of a firm by both the banks and the public investors are critical to the firm's choice of private debt versus public debt. It is especially the case in Japan since we suspect that due to the arrangements of regular meetings in president councils as well as sending directors to member firms, *keiretsu* banks should have more private information about the *keiretsu* firms than the other non-affiliated borrowing firms. As a result, the lemon premiums required by the *keiretsu* banks on the former should be smaller than that on the latter.

One may argue that what is implied is only that, compared with the non-affiliated firms, *keiretsu* firms will use more loans supplied by the banks within the same grouping. It may not infer that the loan ratio of *keiretsu* firms will be higher than non-affiliated firms due to the following reasons,

(1) *Keiretsu* firms also have borrowings from the banks outside their groupings. As noted in the previous chapter, the amount of these loans typically accounts for three quarters of total loan amount of *keiretsu* firms.
(2) The lemon premiums required by non-*keiretsu* banks on *keiretsu* firms will not be as low as those by *keiretsu* banks due to the former are not supposed to possess the private information of the firms as the latter do.
(3) Therefore, we should not expect the difference in total lemon premiums (*keiretsu* banks + non-*keiretsu* banks) incurred by *keiretsu* firms and non-*keiretsu* firms is significant due to the overwhelming portion of loans amount of *keiretsu* firms is supplied by non-*keiretsu* banks. As a result, the variations in their loan ratios would not be marked.

This argument overlooks one important fact that, as discussed in the last chapter, the main banks in *keiretsu* act as the *delegated monitor* for all other creditors of member firms. In the previous chapter, we have shown that there were a number of incidents in

which when *keiretsu* firms were bankrupt, then their main banks would take up the losses of other creditors . As a result, it is not unreasonable to expect that the non-*keiretsu* banks will behave as if they have the same information about the *keiretsu* firms as the *keiretsu* banks. Then our argument implies that *keiretsu* firms should have a higher loan ratio relative to the non-*keiretsu* firms. Similar to the case of debt ratio, we shall divide the firms into three groups: council members and non-council members of *keiretsu* as well as the non-affiliated firms.

Apart from the group affiliations, we shall also incorporate the following hidden information indicators in the regression equation as suggested by Mackie-Mason: Dividend payment, forecasting variance of earnings (following Mackie-Mason, we shall use the variance of the first difference of operating income as proxy), annual change in stock price of a firm, and the intensity in research and development[16]. At the same time, we shall also enter the following variables. The first is log of sales which measures the size of firm. Our expectation is that its effect on the loan ratio is negative due to government regulation. The larger a firm, the more likely that it is eligible to issue bond, then its bond usage should be greater. Another interpretation that is consistent with the story of Mackie-Mason is that larger firm may have greater reputation, and hence lower lemon premium required by the investors. The second one is banks' holdings of shares of a firm. We expect that the effect on loan ratio is negative for risk diversification. The last one is the dummy for the firms in petroleum and coal industry to capture the possible industry-specific effect.

We summarize these propositions, their proxy explanatory variables and their expected effects on bank loan-bond issue choice in Table 4.6 shown in the next page.

Table 4.6: Determinants of Bank Loan-Bond Issue Choice

Factors	Proxy Variables	Effect on Bank Loan/Bond
- Group affiliation	G1	+
	G2	+
- Dividend behaviour	DIV	-
- Forecasting variance of earnings	VOPER	+
- Change in stock price	CSP	-
- Intensity in R&D	(R&D/SALES)	+
- Others	SIZE	-
	BSHR	-
	I	+

Explanatory notes for Table 4.6:

G1 & G2:	Group dummies (see Table 4.5 for detailed definitions)
DIV:	Dummy variable which equals 1 if the payout ratio of a firm is positive; 0 otherwise.
VOPER:	Variance of the first difference of operating income divided by 10^9.
CSP:	Annual percentage change in stock price.
R&D:	Research and development expense.
SALES:	Sales volume.
BSHR:	Percentage of shares of a firm held by banks.
I:	Dummy for the firms in petroleum and coal refining industry.

D. Data Sources and Methods of Sampling and Estimation

The data used for estimation is individual firm data of a sample of 357 Japanese manufacturing corporations listed in the First Section of Tokyo Stock Exchange during 1982 - 1991. There are two data sources: various issues of Analyst Guide and Japan Company Handbook published by Daiwa Securities Research Institute and Nihon Keizai Shimbun Inc. respectively. These two publications provide major accounting information of each individual firm listed in Tokyo Stock Exchange.

There are two criteria for drawing this sample. First, they must be listed in the First Section of Tokyo Stock Exchange continuously throughout 1982 - 1991. Second, they

must have the same accounting period for the reason of comparability among firms. We have selected firms with accounting period April 1st - March 31st since it is more common among the Japanese corporations. In other words, the sample is not a random sample. As a consequence, the obtained statistics and the estimation results may not be carried over to the whole population. The distribution of firms in our sample across industries are shown in Table 4.7,

Table 4.7: Distribution of Firms in the Sample by Industry

	Number of Firms		
Industry	(A) In the Sample	(B) In the Population[a]	(A)/(B)
Food	24	54	0.44
Textiles	13	43	0.30
Pulp & Paper	12	18	0.67
Chemicals	65	119	0.55
Petroleum & Coal	6	9	0.67
Rubber	5	9	0.56
Glass & Ceramics	13	31	0.42
Iron & Steel	24	36	0.67
Non-Ferrous Metal	18	24	0.75
Metal	13	21	0.62
Machinery	47	83	0.57
Electrical Machinery	59	103	0.57
Transportation Equip.	35	48	0.73
Precision Equip.	15	18	0.83
Miscellaneous	8	26	0.31
Total	357	642	0.56

[a] The population figures are as at 1988. Source: Analyst Guide, Daiwa Securities Research Institute.

Since our data set is a combined time-series cross-sectional data, direct application of OLS estimation method may not be appropriate since there may exist correlations in the residuals among different firms within the same period or between different time periods of the same firm which invalidate the underlying assumptions of OLS.

In general, there can be three methods for estimating a model which is based on a combined time-series cross-sectional data set. The first is called *within estimator*, or more commonly known as dummy variable estimator. "Within" because it utilizes the variation of a cross sectional unit only to estimate the parameters of a model. The second one is called *between estimator*, under which OLS is applied to the means of various variables specified in the model. The means of the variables are calculated by averaging across time for each cross sectional unit. As a result, the number of observations under this method will be equal to the number of cross sectional units in the data set, and the estimation will based solely on the variation between different cross sectional units. That is why this estimator is called between estimator. The last one is known as *error component estimator*, which is in fact a generalized least square estimator. It can be shown that it is an efficient combination of within estimator and between estimator (Judge *et al.* (1985), pp.523).

The choice of estimation choice depends very much on the objective of the study. Recall that our primary objective is to understand the determinants of the observed variations among firms in choosing optimal debt-equity mix and bank loan-bond issue mix. Thus we should use a estimation method which produces the estimates that reflect *purely* the interfirm differences. Consequently, we adopt the between estimator for our study since it can serve our purpose. Since both of the within estimator and the error component estimator make use wholly or partly the variations within an individual cross sectional unit, they are not pertinent to our study.

E. Estimation Results and Discussions

In this section, we shall present the estimation results and discern their implications. But before further proceeding, we first discuss the data adjustments and the choice of the dependent variables used for estimation.

As noted in the previous chapter, the accounting data of Japanese corporations cannot be directly compared with those of their western counterparts due to the differences in treatment of the tax-deductible reserves. In western accounting practices, such reserves are counted as owner's equity. Nevertheless, they are posted as liabilities by the Japanese corporations (Suzuki and Wright (1985)). In principle, since these reserves are drawn discretionally from the retained earnings, they do not represent any liability of a corporation. Thus they should be regarded as equity instead of liability. In view of this argument, we shall deduct the amount of such reserves from total liabilities of each corporation and then add that amount to shareholders' equity to derive the "correct" levels of debt and equity[17].

For the estimation of regression of debt-equity choice, we may either use debt ratio or debt-equity ratio as dependent variable which are theoretically equivalent. Nevertheless, there are some firms whose total liabilities are greater than their assets. As a result, these firms will have a very high debt ratio but very low debt-equity ratio from the arithmetical point of view. In view of the fact that such firms are heavy debt users, debt ratio rather than the debt-equity ratio can reflect their real situations. Therefore we shall use debt ratio rather than debt-equity ratio for our econometric estimation.

Likewise, with regard to the choice of bank loan-bond issue, there are two options for dependent variable, the ratio of bank loan to bond outstanding or the loan ratio which are again theoretically equivalent. In our study, we have used the latter as dependent variable for a practical reason. There are some firms in our sample that either do not use any bank loans or do not issue bonds or both. It implies that both options could result undefined dependent variable as division by zero is involved. To avoid this problem, we have to exclude some of these firms from our sample. If we use the ratio of bank loan to bond outstanding or its reciprocal as dependent variable, then we have to delete the observations of firms with zero bond outstanding or zero bank borrowing respectively. On the contrary, if we use the loan ratio as dependent variable, we only need to dispose

the data of firms with both zero bank borrowings and zero bond outstanding which are relatively rare in our sample. In light of these considerations, we opt for loan ratio as the dependent variable so as to maximize the number of degree of freedom.

Meanwhile, as justified Section B, we shall only include long term bank loans in defining the loan ratio. Based on the aforementioned considerations, the regression equations for the debt-equity choice and bank loan-bond choice are specified respectively as follows,

$$(D/TA)_i = \alpha_0 + \sum_{j=1}^{k} \alpha_j X_j + \varepsilon_i \quad (i = 1.....357;\ k=11) \qquad (1)$$

$$L/(L+B)_i = \beta_0 + \sum_{j=1}^{k'} \beta_j Z_j + \eta_i \quad (i = 1.....337;\ k'=9) \qquad (2)$$

where

D:	Debt outstanding.
TA:	Total asset.
L:	Long term bank borrowings.
B:	Bond outstanding.
X_j:	The explanatory variables for the debt-equity choice as shown in Table 4.5.
Z_j:	The explanatory variables for the bank loan-bond issue choice as shown in Table 4.6.

Recall that we shall use the between estimator for estimation. Thus all the variables specified in the equations (1) and (2) are the means of variables over the period 1987 - 1991. The reason for averaging over this period instead of the 1982 - 1991 is that one of the explanatory variable in equation (1) is the historical volatility of operating income which is a proxy for the operating risk faced by a firm. This variable is measured by the coefficient of variation of operating income during the current period and the past five periods. Consequently, the full set of variables for estimation is available since 1987, which accounts for the reason why we only average the variables over 1987 - 1991.

We shall first discuss the estimation results of the equation (1) first, which are shown in the Table 4.8 below. Note that we do not show the results for the variance of the operating income as well as the corporate shareholdings since both of these variables are found to be statistically insignificant. As a result, we re-estimate the model by dropping these two variables. The possible reasons for their insignificance will be discussed in the latter part of this section.

Table 4.8: Estimation Results for Debt-Equity Choice Equation

Factors	Variables	Estimate	t-Statistic
	Intercept	0.2040	1.994
Non-debt tax shield	(DEP+R&D+RES)/TA	-0.9263	-9.032
Bankruptcy cost	G1	0.0699	4.538
	G2	0.0486	3.732
	(TAN/TA)	0.6083	6.408
	(LA/TA)	0.4248	5.050
	(OPER/TA)	2.3638	6.710
	SIZE	0.0123	2.161
Pecking order	(NET/TA)	-10.1503	-15.182
Others	I	0.1275	2.973
R^2	0.6732		
Adjusted R^2	0.6642		
RSS	3.1807		

The variable measuring the non-debt tax shields is of expected negative sign and statistically significant at 5% level. This finding lends support to the models of DeAngelo and Masulis (1980) and Dotan and Ravid (1985) which argue the substitutability of non-debt tax shields for interest deductions. The greater the amount of non-debt tax shields,

the smaller the portion of interest payments that can be deducted from earnings. Consequently, the use of debt will be discouraged.

With respect to the variables package of bankruptcy cost argument, let us focus on the group affiliations first. Both of the group dummies are significant and in the expected positive signs. There are two implications for these results: First, on average affiliations with *keiretsu* do enable the member firms to use more debt. Second, there does exist differential impacts of *keiretsu* affiliations on council members and the non-council members. Our results show that on average the debt ratio of the council members exceeds that of the non-council members by about 2%. It is presumably due to the fact that since council members have closer and longer relationships with the main banks so that in case of financial distress, they will be more likely to be bailed out compared with the non-council members.

The variables gauging the amount of tangible and liquid assets are significant with expected positive signs. Again it confirms our hypothesis that the more tangible or liquid assets a firm has, the higher the value of collateral when the firm is bankrupt and liquidated, and the loss incurred by the creditors, and hence their required premium for lending to the firm, will be less.

The level of operating income also matters in debt-equity choice by Japanese corporations. Another variable in the package under bankruptcy cost factor that is also critical to the choice of debt ratio is the log of sales, which is the proxy variable for firm size. As discussed before, it represents the greater ability of large firms to diversify their portfolios and operations and thus the bankruptcy risk faced by them tend to be lower.

The variable (NET/TA), which enters the equation under the pecking order hypothesis, has the greatest value of estimate (in absolute value) and t-statistic. In other words, the availability of internal fund is a very important consideration of the Japanese

manufacturing corporations in choosing their debt policies. The greater the availability of internal fund, the less reliance of the firms on external fund in general and on debt in particular.

Lastly, the dummy for the petroleum and coal industry is statistically significant and with the expected positive sign. This result suggests some industry-specific factors are in force which are not captured by the other variables in the model. One possible factor is the preferential government policies toward the firms in petroleum and coal refining industries since the First Oil Crisis. Specifically, these firms have been given interest subsidies for their borrowing. As a result, the effective interest cost faced by these firms will be comparatively lower, which encourages them using more debts[18].

Having discussed all the results shown in Table 4.8, we now try to explain the statistical insignificance of two variables which are included in our model at the very beginning. The first one is the variance of operating income. If the variable is a good proxy for the business risk faced by the corporations, then its insignificance suggests that the Japanese corporations do not regard the business risk in the choice of debt equity ratio, which sounds counter-intuitive. Therefore, it is very likely that the variable used does not serve as a good proxy for business risk. Recall that business risk is defined as the perceived variance of earnings within a single period, which is not necessarily related to its historical volatility, the variable used in our model. As a result, it seems necessary to search for other better proxy variables in future work.

The other variable which has been dropped from our estimated equation is the corporate shareholdings. While it is in the expected positive sign, it is not statistically significant. It may be due to the fact that the variable proxies another effect: the diversification effect. Under this effect. we expect that the banks or firms with large shareholdings of a firm should lend less to the firm so as to diversify their risk. As a result, coupled with the effect of efficiency cost, the overall effect of this variable on debt ratio will be ambiguous.

Now we turn to the bank loan-bond issue choice. The estimation results are shown in Table 4.9 overleaf. Again we only present the results of the variables which have been found to be statistically significant.

From the table, it is readily observed that group affiliation affects not only the debt-equity choice but also the mix between bank loan and bond issue. Both of the coefficients are significant. At the same time, the dummy for council member is greater than that of the non-council member. This finding confirms our *a priori* expectation that the close relationship between the main bank and the council members supports ensures the smooth flow of information, which induces the latter to use more bank loans relative to bond issues compared with the non-council members.

Table 4.9: Estimation Results for Bank Loan-Bond Issue Choice Equation

Factors	Variables	Estimate	t-Statistic
	Intercept	1.8600	8.657
Group affiliations	G1	0.2210	4.851
	G2	0.1013	2.604
Dividend payment	DIV	-0.3076	-2.643
Forecasting variance in earnings	VOPER	0.0417	2.468
Others	SIZE	-0.0819	-4.238
	BSHR	-3.5849	-2.632
	I	0.4194	3.279
R^2	0.1677		
Adjusted R^2	0.1499		
RSS	28.4663		

Let us switch our focus to the "hidden information indicators" and discuss them in turn. DIV, the dummy variable distinguishing firms paying dividend from those that do not, has an expected negative sign and statistically significant even at 1% level in both models. This finding tells us that dividend payment does carry the information about the future prospects of a firm which are by assumption possessed by the firm. As a result, the investors of the dividend-paying firm demands a lower lemon premium than those of the non-dividend paying firms, which leads to the observed difference in adopted loan ratio.

With regard to the forecasting variance of the earnings, it is in the expected positive sign and significant. It implies that the greater the forecasting variance of earnings, the more likely that the investors less information about the future prospects of the firm. Therefore a larger premium on bond issue is required.

The sign of log of sales volume is matched with our *a priori* expectation and it is significant at 5% level. The larger a firm is, the more likely that it is eligible to issue bonds of various types. It will be reflected in its choice of bank loan versus bond issues. Another interpretation of this result comes from the hidden information story. The larger firms tend to be followed more closely by the investment analysts. As a result, the lemon premium required by public investors may be lower for them (Mackie-Mason (1990)).

Lastly, the variable BSHR, the ratio of shares of a firm held by banks, affects negatively the loan ratio, which confirms our belief of risk diversification by banks. It is interesting to contrast this finding with one of the conclusions in Kim (1991), which is a study on the determinants of shareholdings by a firm's main bank in Japan. He has found that one of the critical explanatory variables is the amount of financing comes from the main bank. The larger the amount of firm's financing comes from its main bank, the greater the shareholdings of its main bank. Coupled with our finding of negative relationship between banks' shareholdings as a whole and the loan ratio of a firm, it is implied that there is an asymmetry in behaviour between the main bank and the other lending banks of a firm:

Main bank increases their shareholdings with loans granted whereas the converse is true to other lending banks. In fact this implication is consistent with the delegated monitor hypothesis by Sheard (1989) as mentioned in the last chapter. The significant shareholdings position of main bank in fact is to achieve greater capability to monitor or even influence the corporate policy of a firm. With this monitoring task taken up by a firm's main bank, the other lending banks need not duplicate the efforts and as a result, they need not commensurate their shareholdings with loans.

Similar to the case of debt-equity choice, the dummy for the petroleum and coal industry exerts independent positive effect on the bank loan-bond issue choice. This is the case because the interest subsidies offered by the Japanese government were available through the government financial institutions. As a result, this encouraged these firms to use bank loans rather than the bond issues[19].

Again we discuss the variables which have been dropped from the equation. The first one is the change in share price, which has been found to be positive and thus it is contrary to our expectation. It may be due to the fact that since the period covered in our analysis coincides with the "bubble period" 1986-1990 in Japan. In other words, the increase in stock price may simply reflect the easy credit condition under the expansionary monetary policy of the Bank of Japan rather than the fundamentals of the firms. As a result, the variable may not be a good indicator for hidden information in our case.

The other variable is the research and development intensity, which is also found to have the wrong sign. It may be explained by that this variable proxies the future prospects of the firm, which tends to lower the lemon premium required by the public investors and thus offsets its hidden information effect.

F. Concluding Remarks

In this chapter, we have documented the issue of financial heterogeneity among the listed manufacturing corporations in Japan. In particular, we are concentrated on the choices between debt and equity as well as bank loan and bond issues and identified econometrically a number of factors determining the different mixes chosen by different types of firms respectively. With respect to the debt-equity choice, we have found that the critical variables include non-debt tax shields, affiliations with *keiretsu*, the amount of tangible and liquid assets a firm has, the level of operating income, firm size, the availability of internal funds, and the dummy for the petroleum and coal refining industry. As to the choice between bank loan and bond issue, our findings indicate that hidden information story is useful to discriminating the firms from having high loan ratio from those of low loan ratio. Also firm size, the ratio of a firms' shares held by banks, and the dummy for petroleum and coal refining industry are also important factors for this choice.

Notes:

[1] Nicknamed "Toyota Bank", Toyota wielded 2.19 trillion yen surplus fund at the end of 1991, which was comparable to the asset of a medium-sized bank in Japan. This large amount of fund was put under the management of its subsidiary, Toyota Finance. Hitachi has also established a subsidiary called Hitachi Credit Corporation to manage its surplus fund.

[2] The details of the data sources and the methods of sampling and estimation will be precisely spelled out in Section D.

[3] Again for clarity, the term "loan ratio" will be used in replacement of the clumsy expression of "the ratio of long term bank loan to long term debt" throughout the chapter.

[4] Here is an asymmetry in the data used for computing the figures in Tables 4.2 and 4.3 (for constructing Figures 4.2 and 4.3 as well): the former is based on the data of all Japanese manufacturing corporations listed in the First Section of Tokyo Stock Exchange while the latter is on our sample data. It is the case because in Analyst Guide there is a table which, grounded on the data of all listed firms, shows the equity ratio by industry. The figures in Table 4.2 are calculated by subtracting 1 by these equity ratios. Nevertheless, there is no such data for the loan ratio in the publication, we thus have to compute the figures with our sample data.

[5] In fiscal 1990, the preferential tax rate was 28%, which was lower than the normal rate 37.5% by 9.5 percentage points (Takashi (1991), pp.44).

[6] The additional tax is charged on the excess of retained earnings of a family corporation over certain amount. In fiscal 1990, the tax rate ranged from around 12% to 24%, depending on the size of such excess (Takashi (1991), pp.62).

[7] In fiscal 1990, the rates for these land transactions were 20% and 30% respectively (Takashi (1991), pp. 97).

[8] In fiscal 1990, the tax credit is the lower of the 10% of the corporation tax or 20% of such excess amount (Takashi (1991), pp. 79).

[9] The major *keiretsu* include Mitsubishi Group, Mitsui Group, Sumitomo Group, DKB Group, Fuyo Group and Sanwa Group.

[10] This implicit contract argument is first put forward by Nagatani (1984).

[11] Hoshi *et al.* study is based on the list of *keiretsu* membership attached as appendix in Nagatani's study (1984), which in turn is drawn from Keiretsu no Kenkyu. That is what "indirectly" means.

[12] As a discussant of Nagatani's study (1984), Hadley (1984) notes that several classifications in the list of corporate membership are doubtful. For instance, Toyota was regarded as a member of Mitsui Group, even though the firm has zero bank borrowings and the main bank of the Group, Mitsui Bank (which was renamed as Mitsui Taiyo Kobe Bank after the merger between Mitsui Bank and Taiyo Kobe Bank and then to Sakura Bank recently), held only 4.98% of its shares which was only slightly more that wielded by Sanwa Bank, the main bank in the Sanwa Group.

[13] Suzuki and Wright (1985) found that *keiretsu* firms are more likely than the non-affiliated firms to file for reorganization rather than liquidation.

[14] For example, Gordon (1962) found a negative relationship whereas Auerbach (1985) found the effect positive (though it is not statistically significant).

[15] One justification for using sales volume as a measure of firm size again comes from the study by Suzuki and Wright (1985). Being an important indicator of "social importance" of a firm, sales has been found statistically to be a critical factor in reducing the bankruptcy risk of Japanese corporations.

[16] Thus we have left out two hidden information suggested by Mackie-Mason. The first is the dummies for industries subject to rate regulation. We have omitted this because no industry in our sample is subject to such regulation. The second is the dummy indicating loss carryforward by a firm which is due to our lack of information about this behaviour about firms in our sample.

[17] All the figures shown in this chapter are based on the adjusted data, except those in Table 4.2 which are based on the original data.

[18] This explanation is not problem-free because this interest-subsidization policy is only known to exist since the early 70's to the early 80's. However, due to the lack of information, it is not certain during the late 80's and the early 90's (the period covered by our sample) such policy was still in force.

[19] See note 18 for the limitation of this explanation.

Chapter 5: Conclusion

In this study, we have examined the capital structure choice of the Japanese manufacturing corporations from both the aggregate and cross-sectional perspectives. At this moment, it seems advisable to summarize the major findings of the study as presented as follows,

1. On the aggregate, the Japanese manufacturing corporations had long been highly dependent on debt for financing. Due to the government regulations which served to discourage raising funds from domestic and overseas capital markets, the Japanese manufacturing corporations turned mainly to banks for their external funding. Nevertheless, with the onset of financial deregulations since the late 1970's, the Japanese manufacturing corporations could have greater access to the cheaper bond financing in both the domestic and overseas markets. Meanwhile, the increase in the availability in internal fund had also encouraged the Japanese manufacturing corporations to stay away from bank loans because, as suggested by Myers and Majluf (1984), internal funding has a cost advantage over the bank loans due to the asymmetric information problem.

2. Cross-sectionally, we have shown that there do exist marked and persistent heterogeneity among the Japanese manufacturing corporations in debt usage. With the econometric tools, we have identified a number of theoretically-motivated variables which are critical to the determination of interfirm differences in debt ratio. They include affiliations with *keiretsu*, the amount of non-debt tax shields, the amount of tangible and liquid assets, the level of operating income, firm size, the availability of internal funds, and the dummy for the industry of petroleum and coal refining.

3. Apart from the debt-equity choice, we have also studied the interfirm differences in the choice of bank loan and bond issue. We have found that the hidden information theory is useful to explain this choice. In other words, the Japanese manufacturing

corporations tend to use more market source of debt when investors require lower lemon premiums on them.

This major contribution of this study is to provide a comprehensive and systematic treatment of the subject of capital structure decisions of the Japanese manufacturing corporations. On the aggregate side, we have tried to delineate the pattern of capital structure over the last two decades and explain the observed change in terms of financial deregulation as well as the increasing availability of internal funds. This part of study is thus building on and extending the existing studies which only attempt to provide an overview of major features of various fund sources in Japan (Hodder and Tschoegl (1985 & 1991)). On the cross-sectional side, we have depicted the interfirm differences in the debt-equity structure and drawn the insights from the theoretical and empirical studies to build an econometric model for identifying the pertinent determinants for the observed differences. This part of study represents a significant improvement over the past study by Nagatani (1985) in that on top of the firm size variable, business group dummies as well as industry dummies which Nagatani uses, we also introduce other variables such as the non-debt tax shields, tangible asset-total asset ratio, and net profit-total asset ratio since the existing studies have already shown that these variables are useful to explain the capital structure decisions in other context and therefore we should also try them in the case of Japan. Indeed the statistical significance of these variables obtained in our study implies that the equation in Nagatani's study has omitted relevant variables and thus the estimates he gets are very likely subject to bias. With respect to the bank loan-bond issue choice, our study is the first attempt to analyze this issue with the hidden information framework under the context of Japanese manufacturing corporations.

It is always claimed that Japan is unique when compared with the western world. Nevertheless, this study shows that, at least to the capital structure decision, the Japanese manufacturing corporations are not as different from their western counterparts as generally perceived since their capital structure decisions are governed by similar

economic considerations. In fact, most of the determinants we find to affect the debt-equity choice of the Japanese manufacturing corporations have already been shown to affect the western firms as well. Meanwhile, the hidden information framework that we have used to account for the bank loan-bond issue choice in Japan have also been demonstrated to be useful to understanding the same choice of the US firms.

Contributions aside, this study is subject to a number of limitations. The most obvious one is in the bank loan-bond issue choice because, as we have seen, from the low adjusted R^2 of the equation, it is implied that while hidden information theory is important to explain the choice between bank loan and bond issue, it is evidently not the only determinant. In other words, there should be some other determinants which have been neglected by the hidden information framework which requires further explorations

On top of this, the hidden information theory *per se* needs improvement at least in the following two areas: First, in our estimated equation, we have found that the research and development expense is negatively affecting the ratio of long term bank loan to long term debt significantly, which is counter to our *a priori* expectation. In fact Mackie-Mason (1990) has also obtained the same result as ours. Therefore, it seems that some other impacts proxied by the expense of research and development on this choice have yet explored. One of the possible neglected impacts is that the intensity of research and development activities may signal the future performance of a firm. The greater the intensity, the better the future performance is expected from investors, and the lower the premium will be demanded.

Another problem with the hidden information framework lies in its theoretical foundation. In fact the explanation of the choice between bank loan and bond issue is based on an assumption that there is a differential access to the private information of different firms. If the information is really private in the sense that such information is only accessible by outside investors only through the disclosure by firms, then the above assumption

presupposes that different firms disclose different levels of their information to investors. As a result, two interesting questions emerge. First, why it is in the interest of firms to disclose their private information to investors? One of the answers in fact can be drawn from Myers and Majluf (1984). If investors are informed the future potential, and hence the true value of the firm, then they will price the claims on the income from the firm fairly such that the underinvestment problem can be avoided even though the firm does not have sufficient amount of internal funds for financing. Second, if disclosure of private information is beneficial to the existing shareholders of firms, then why should there be differential levels of information disclosure among firms as implicit in the assumption of Mackie-Mason framework? What are the determinants for the level of information disclosure? Only after a satisfactory answer is obtained on this question before the hidden information story can be firmly established.

Therefore much work remains to be accomplished on the choice between bank loans and bond issue, and it is hoped that our study would stimulate further theoretical research on this issue so as to furnish the hidden information story with a more solid foundations and identify other pertinent determinants for the choice between bank loans and bond issue.

Bibliography

1. Akerlof, G., "The Market for Lemons: Qualitative Uncertainty and the Market Mechanism", Quarterly Journal of Economics, 84, 1970, pp.488-500.

2. Analyst Guide, Daiwa Securities Research Institute, various issues.

3. Aoki, Masahiko, "Toward an Economic Model of the Japanese Firm", Journal of Economic Literature, Vol. XXVIII, March 1990, pp.1-27.

4. Asquith, Paul, and David W. Mullins, Jr., "Equity Issues and Offering Dilution", Journal of Financial Economics, 15, 1986, pp.61-89.

5. Auerbach, Alan J., "Real Determinants of Corporate Leverage", in B. Friedman (Ed), Corporate Capital Structures in the United States, University of Chicago Press, 1985, pp.301-322.

6. Bagnoli, M., and N. Khanna, "Equilibrium with Debt and Equity Financing of New Projects: Why More Equity Financing When Stock Prices are High?", Working Paper, University of Michigan, Department of Economics, 1987.

7. Ballon, Robert J., and Iwao Tomita, The Financial Behaviour of Japanese Corporations, Kodansha International, Tokyo and New York, 1988.

8. Bhattacharya, S., "Imperfect Information, Dividend Policy, and the "Bird in the Hand" Fallacy", Bell Journal of Economics 10, 1979, pp.225-235.

9. Bradley Michael, Gregg Jarrell, and E. Han Kim, "On the Existence of an Optimal Capital Structure: Theory and Evidence", Journal of Finance, 39, 1984, pp.857-878.

10. Bulow, Jeremy and John Shoven, "The Bankruptcy Decision", Bell Journal of Economics 9, 1978, pp.437-456.

11. Cable, John and Paul Turner, "Asymmetric Information and Credit Rationing: Another View of Industrial Bank Lending and Britain's Economic Problems", in D. Currie (Ed.), Advances in Monetary Economics, ESRC Money Study Group, 1985.

12. Caves, R. And M. Uekusa, Industrial Organization in Japan, Brookings Institution, 1976.

13. Chaplinsky, Susan, and Greg Niehaus, "The Determinants of Inside Ownership and Leverage", Working Paper, University of Michigan, 1990.

14. Chiarella, Carl, Toan M. Pham, Ah Boon Sim, and Madeleine M.L. Tan, "Determinants of Corporate Capital Structure: Australian Evidence", in Rhee, S.G., and Chang R. P. (Ed), Pacific Basin Capital Markets Research, Vol. III, 1992, pp.139-158.

15. Crutchley, C.E., and R.S. Hansen, "A Test of Agency Theory of Managerial Ownership, Corporate Leverage and Corporate Dividends", Financial Management, Winter 1989, pp.36-46.

16. Cutler, David, and Lawrence Summers, "The Costs of Conflict Resolution and Financial Distress: Evidence from Texaco-Pennzoil Litigation", Rand Journal of Economics, 19, 1988, pp.157-172.

17. DeAngelo, H., and R.W. Masulis, "Optimal Capital Structure under Corporate and Personal Taxation", Journal of Finance 8, 1980, pp.3-29.

18. Diamond, D., "Financial Intermediation and Delegated Monitoring", Review of Economic Studies, 51, 1984, pp.393-414.

19. Dotan, A., and S.A. Ravid, "On the Real and Financial Decisions of a Firm under Uncertainty", Journal of Finance ,40, 1985, pp.501-517.

20. Elston, C.D., "The Financing of Japanese Industry", Bank of England Quarterly Bulletin, December 1981, pp.510-518.

21. Economic Statistics Annual, Bank of Japan, 1993 issue.

22. Fama, Eugene F., and Merton H. Miller, The Theory of Finance, Holt, Rinehart, and Winston, New York, 1972.

23. Ferri, M.G., and W.H. Jones, "Determinants of Financial Structure: A New Methodological Approach", Journal of Finance, 34, 1979, pp.631-644.

24. Frankel, Jeffrey A., "Japanese Finance in the 1980's: A Survey", in Paul Krugman (Ed.), Trade with Japan, National Bureau of Economic Research, The University of Chicago Press, 1991.

25. Friend, I., and J. Hasbrouck, "Determinants of Capital Structure", Research in Finance 7, 1988, pp.1-19.

26. Gertner, Robert, and David Scharfstein, "A Theory of Workouts and the Effects of Reorganization Law", Working paper, University of Chicago, Chicago, IL, 1989.

27. Gordon, M.J., The Investment, Financing, and Valuation of the Corporation, Homewood, IL, Irwin, 1962.

28. Goto, Takeshi, "Bond Market: Current Situation and Legal Aspects", in Lectures on Japanese Securities Regulations, Tokyo, Japan Securities Research Institute, 1980.

29. Grossman, Sanford J., and Oliver Hart, "Corporate Financial Structure and Managerial Incentives", in J. McCall (Ed.), The Economics of Information and Uncertainty, University of Chicago Press, Chicago, 1982.

30. Hadley, Eleanor, "Counterpoint on Business Grouping and Government-Industry Relations in Automobiles", in Aoki, M. (Ed), The Economic Analysis of Japanese Firm, Elsevier Science Publishers B.V., North-Holland, 1984, pp.319-327.

31. _____, Antitrust in Japan, Princeton University Press, Princeton, NJ, 1970.

32. Hodder, J.E., "Corporate Capital Structure in the United States and Japan: Financial Intermediation and Implications of Financial Deregulation", in J.B. Shoven (Ed.), Government Policy Towards Industry in the United States and Japan, New York, Cambridge University Press, 1988.

33. _____, "Is the Cost of Capital Lower in Japan?", Journal of the Japanese and International Economies, March 1991, pp.86-100.

34. Hodder, J.E. and A.E. Tschoegl, "Some Aspects of Japanese Corporate Finance", Journal of Financial and Quantitative Analysis, 20, 1985, pp.173-191.

35. _____, "Corporate Finance in Japan", in Shinji Takagi (Ed), Japanese Capital Markets - New Developments in Regulations and Institutions, Blackwell, Oxford UK & Cambridge USA, 1993.

36. Hoshi, Takeo, Anil Kashyap, and David Scharfstein, "The Role of Banks in Reducing the Costs of Financial Distress in Japan", Journal of Financial Economics 27, 1990, pp.67-88.

37. _____, "Bank Monitoring and Investment: Evidence from the Changing Structure of Japanese Corporate Banking Relationships", in R.G. Hubbard (Ed), Asymmetric Information, Corporate Finance and Investment, University of Chicago Press, 1990, pp.105-126.

38. Industrial Groupings in Japan - The Anatomy of the "Keiretsu", Dodwell Marketing Consultants, Tenth Edition, 1992/93.

39. Japan Company Handbook, Nihon Keizai Shimbun Inc., various issues.

40. Jensen, M.C., "Agency Costs of Free Cash Flow, Corporate Finance and Takeovers", American Economic Review, 76, 1986, pp.323-339.

41. Jensen, M.C., and W.H. Meckling, "Theory of the Firm: Managerial Behaviour, Agency Costs and Capital Structure", Journal of Financial Economics 3, 1976, pp.305-360.

42. John, K., and J. Williams, "Dividends, Dilutions and Taxes: Signalling Equilibrium", Journal of Finance 40, 1985, pp.1053-70.

43. Judge, G.G., W.E. Griffiths, R.C. Hill, H. Lutkepohl, and T.C. Lee, The Theory and Practice of Econometrics, 2nd Edition, New York, Wiley, 1985.

44. Keiretsu no Kenkyu (Studies on Financial Corporate Groupings), Keizai Chosa Kyokai, Tokyo (Annual Publication).

45. Kim, Sun Bae, "The Use of Equity Position by Banks: The Japanese Evidence", Federal Reserve Bank of San Francisco Economic Review, Fall 1991, pp.41-55.

46. Long, Michael, and Ileen Malitz, "The Investment-Financing Nexus: Some Empirical Evidence", Midland Corporate Finance Journal, 3, 1985, pp.53-59.

47. Mackie-Mason, Jeffrey K., "Do Firms Care Who Provides Their Financing?", in R.G. Hubbard (Ed), Asymmetric Information, Corporate Finance and Investment, University of Chicago Press, 1990, pp.307-332.

48. Marsh, P., "The Choice between Equity and Debt: An Empirical Study", Journal of Finance, 37, 1982, pp.121-144.

49. Masulis, Ronald W., "The Impact of Capital Structure Change on Firm Value: Some Estimates", Journal of Finance, 38, 1983, pp.107-126.

50. Masulis, Ronald W., and Ashok N. Korwar, "Seasoned Equity Offerings: An Empirical Investigation", Journal of Financial Economics, 15, pp.91-118.

51. Mayer, Colin, "Financial Systems, Corporate Finance, and Economic Development", in R.G. Hubbard (Ed), Asymmetric Information, Corporate Finance and Investment, University of Chicago Press, 1990, pp.307-332.

52. Meerschwan, David M., "The Japanese Financial System and the Cost of Capital", in Paul Krugman (Ed.), Trade with Japan, National Bureau of Economic Research, The University of Chicago Press, 1991.

53. Mikkelson, Wayne H., and M. Megan Partch, "Valuation Effects of Security Offerings and the Issuance Process", Journal of Financial Economics, 15, 1986, pp.31-69.

54. Miller, Merton H., "Debt and Taxes", Journal of Finance, 32, May 1977, pp.261-275.

55. Miller, M. And K. Rock, "Dividend Policy under Asymmetric Information", Journal of Finance 40, 1985, pp.1031-51.

56. Modigliani, Franco, and Merton H Miller, "The Cost of Capital, Corporation Finance, and the Theory of Investment", American Economic Review, 3, June 1958, pp.261-297.

57. _____, "Corporate Income Taxes and the Cost of Capital: A Correction", American Economic Review, 3, June 1963, pp.433-443.

58. Myers, Stewart C., "The Search for Optimal Capital Structure", Midland Corporate Finance Journal 1, Spring 1983, pp.6-16.

59. _____, "Capital Structure Puzzle", Journal of Finance, 3, July 1984, pp.575-592.

60. Myers, Stewart C., and N. Majluf, "Corporate Financing and Investment Decisions When Firms Have Information Investors Do Not Have", Journal of Financial Economics, 13, 1984, pp.187-221.

61. Nagatani, I., "The Economic Role of Corporate Financial Grouping", in Aoki, M. (Ed), The Economic Analysis of Japanese Firm, Elsevier Science Publishers B.V., North-Holland, 1984, pp.227-258.

62. OECD Economic Survey on Japan, 1989/90 issue.

63. OECD Financial Statistics Part 3: Non-financial Enterprises' Financial Statements, various issues.

64. Pascale, Richard and Thomas P. Rohlen, "The Mazda Turnaround" Journal of Japanese Studies, 9, 1983, pp.219-263.

65. Riley, J.G., "Informational Equilibrium", Econometrica, 47, 1979, pp.331-359.

66. Rosembluth, Frances, Financial Politics in Contemporary Japan, Cornell University Press, NY, 1989.

67. Ross, Stephen, "The Determination of Financial Structure: The Incentive Signalling Approach", Bell Journal of Economics, 8, 1977, pp.23-40.

68. Sheard, P., "The Main Bank System and the Corporate Monitoring and Control in Japan", Journal of Economic Behaviour and Organization 11, 1989, pp.399-422.

69. Smith, C., and J. Warner, "On Financial Contracting", Journal of Financial Economics 7, 1979, pp.117-161.

70. Solow, Robert M., "A Contribution to the Theory of Economic Growth", Quarterly Journal of Economics, February 1956, pp.65-94.

71. Spence, A.M., Market Signalling, Cambridge, Harvard University Press, 1974.

72. Stiglitz, J. and A. Weiss, "Credit Rationing in Markets with Imperfect Information", American Economic Review, 71, 1981, pp.393-410.

73. Suzuki, S, and Richard W. Wright, "Financial Structure and Bankruptcy Risk in Japanese Companies", Journal of International Business Studies, Spring 1985, pp.97-110.

74. Suzuki, Yoshio, The Japanese Financial System, Clarendon Press, Oxford, 1990.

75. Taggart, Jr., Robert A., "Secular Patterns in the Financing of U.S. Corporations", in B. Friedman (Ed.), Corporate Capital Structure in the United States, University of Chicago Press, 1985.

76. Takashi, Kuboi, Business Practices and Taxation in Japan, The Japan Times Ltd., 1991.

77. Tatewaki, Kazuo, Banking and Finance in Japan - An Introduction to the Tokyo Market, Routledge, London and New York, 1991.

78. Titman, Sheridan and Robert Wessels, "The Determinants of Capital Structure Choice", Journal of Finance, 43, 1984, pp.1-19.

79. Warner, Jerold, "Bankruptcy Costs: Some Evidence", Journal of Finance 32, 1977, pp.337-347.

80. Watts, R.L., and J.L. Zimmerman, Positive Accounting Theory, Englewood Cliffs, NJ, Prentice-Hall, 1986.

81. Weiss, Lawrence A., "Bankruptcy Resolution: Direct Costs and Violation of Priority Claims", Journal of Financial Economics 27, 1990.

82. Williamson, O., The Economic Institutions of Capitalism, Free Press, New York, 1985.

83. Yamamoto, Shigeru, "The Japanese Bond Market", in Shinji Takagi (Ed), Japanese Capital Markets - New Developments in Regulations and Institutions, Blackwell, Oxford UK & Cambridge USA, 1993.